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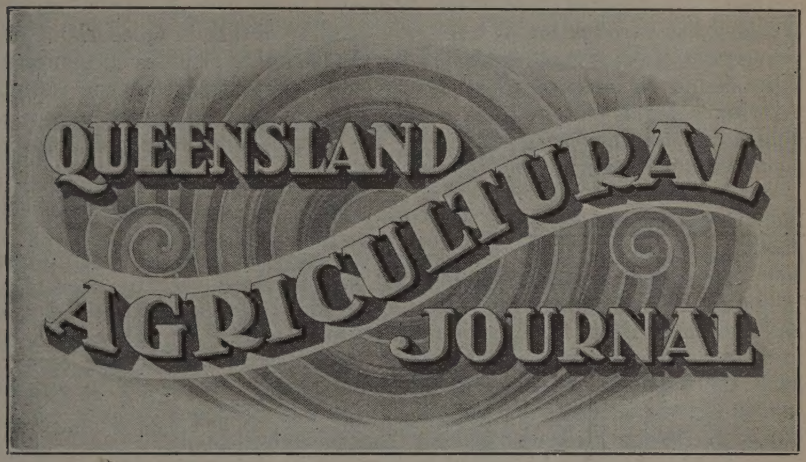

VOL. XLI. 1 MARCH, 1934. PART 3.

Event and Comment.

Co-ordinating Agricultural Research.

AMONG the many important matters discussed at the annual conference of Ministers for Agriculture at Hobart last month was the need for co-ordinating the research and experimental work of the different States of the Commonwealth. The Queensland Minister (Hon. Frank W. Bulcock) said that overlapping and duplication occurred, and suggested the setting up of an organisation representative of the States, so that specific problems might be allotted to each State for investigation and, if possible, solution. He further suggested that State officers should confer on the proposal for establishing a basis for co-ordination.

Recommendations adopted by the conference included the following:—That eggs should be branded "chilled" before being placed in cold storage, except eggs intended for oversea export, which should be placed in cool storage in bond; that, to improve the quality of butter, dairy laboratories should be established in all States; that provision should be made in each State for registration of premises used for cool storage of eggs and other products; that the States should consider the possibility of adopting the Canadian system of regulating hatcheries; that the practice of taking an annual census of wheat varieties should be adopted by all States; that each State should undertake investigation work to improve the milling and baking quality of wheat; that action should be

taken to prevent the introduction of plant diseases in imported seed, and that the Federal authorities should consult State departments about the methods to be adopted; that States interested in tobacco production should consider the introduction of legislation similar to that in Queensland for preventing disease; that legislation for the branding of hides on economic lines should be adopted in all States; and that legislation controlling veterinary biological products should provide that no person except a qualified veterinary surgeon should use vaccine serum or a diagnostic agent without a permit or license.

Improving a National Asset.

COMMENTING on a report on grass experiments at Bybera, in the Goondiwindi district, which he had received recently from Dr. Hirschfeld, the Minister for Agriculture, Mr. Bulcock, commended this and similar projects for improving a national asset. Dr. Hirschfeld, he said, was performing a national work, and was not asking the department for financial assistance in the undertaking. He would be safe in saying that no individual within the State was making a greater contribution to the knowledge of grasses than that gentleman.

Seed should not, according to the report, be planted for pastoral purposes in small plots, as the wind carried it from one plot to another, and might falsify results. Experiments extending over one or two years furnished no definite conclusions, but the best instance was furnished by the Buffel grass. Dr. Hirschfeld added that he was concerned over his failure to obtain anything like a fair growth of the different varieties of saltbush, particularly old man saltbush. This failure was all the more remarkable as some of the saltbushes grew naturally on the place, though not abundantly.

Regarding Flinders and Mitchell grasses, Dr. Hirschfeld is quite satisfied that the results of the experiments on Bybera will bear nation-wide fruit. It is clear, however, that the experiments represent only the first stage of the work. The second stage, on which Dr. Hirschfeld and his son, Mr. R. S. Hirschfeld, intend to embark later, will be to ascertain the reaction of stock to the grasses, as the final judges are the bullock and the sheep. Dr. Hirschfeld's report concludes with the statement that whatever results are obtained will not only be for private use, but will be at the disposal of all the people of the West.

The Queensland Meat Industry.

"IT is certainly essential to develop the export market . . . and it is necessary to co-ordinate domestic with overseas markets, for the exporter must be assured of profitable working and steady supplies." Those remarks were among the chief points of the opening address by the Minister for Agriculture (Mr. Bulcock) at the recent conference of representatives of the meat industry in Brisbane. Mr. Bulcock, in the course of further remarks, said that the conference had been convened under his presidency at the request of the Premier (Hon. W. Forgan Smith), who, he regretted, was unable to preside, on account of his being otherwise engaged at the Premiers' Conference in Melbourne. Continuing, he said that he had the assurance of the Premier that the

Government desired the devising of some effective means whereby the interests of the industry might be actively and adequately promoted. The Premier was convinced that some basis of organisation satisfactory to all concerned could be evolved, and hoped that the conference would be frank and complete in its recommendations, which would be considered on the Premier's return from the South.

It was certainly essential, added the Minister, to develop the export market, and he had observed with satisfaction that the producers' organisations had already arrived at the conclusion that it was necessary to co-ordinate domestic with overseas markets, and that the exporter must be assured of profitable working and continuity of supplies. He was convinced that for marketing boards to succeed a high degree of efficiency was required, and he believed that in the near future all the commodity boards in Queensland would be asked individually to become associated with the development of further markets. In formulating any plans for any new organisation that was contemplated, he hoped that the fact would not be lost sight of that the consumer had a right to consideration; also that efficiency in production was demanded by modern marketing methods. Stabilisation of prices must be backed by efficiency in organisation; otherwise the results sought would not be achieved. Any proposals submitted should lead to the material and progressive elevation of the standard of the industry. Information had been received from overseas that in many cases our meat had not compared favourably in quality with meat from other countries. It was essential, therefore, to strive to maintain a degree of efficiency in production, treatment, and transport comparable at least with that of our competitors on the markets abroad. Other matters which merited consideration at the conference were the provisions of the Ottawa Agreement relating to the supply of meat to the British market; proper provision for the domestic meat supply at wholesale prices to be determined by an independent tribunal on lines similar to the Cane Prices Board; provision for the purchase of vealers from farmers to supply the local retail trade, as well as the export market; a conference with pig raisers as to the best means of arranging for the disposal of fresh pork. Definite protection would have to be given to the pig raising industry, remarked Mr. Bulcock, as it had not yet been correlated with other branches of the meat industry.

In the course of the general discussion that ensued, it was plain that the consensus of opinion was definitely in favour of the complete organisation of the meat industry on lines similar to that governing other primary industries in Queensland. The Government, it was suggested, might be requested to proclaim meat as a commodity under the Primary Producers' Organisation Acts to enable a poll to be taken of the meat producers of the State to determine whether they would be in favour of such an organisation. A committee was appointed to consider this suggestion in all its implications, and, if adopted, to submit a recommendation regarding a proclamation to the Government for approval.

The Sugar Industry—Surplus Production Problem.

ADDRESS BY THE PREMIER.

Subjoined is the full text of the notable address with which the Premier, Hon. W. Forgan Smith, opened the recent Conference of representatives of every section of the Queensland Sugar Industry in Brisbane. At that Conference the Peak Year Scheme was discussed, and the principles underlying it were unanimously reaffirmed.

The Premier's appreciation of the surplus production problem will be read with interest by all concerned with the welfare and progress of one of Australia's greatest agricultural industries.—Editor.

IN his opening address at the Sugar Conference in the Land Court, Brisbane, on 24th January, the Premier, Hon. W. Forgan Smith, said:—

I desire, on behalf of the Government of Queensland, to welcome you to this Conference and to express the desire that the work of the Conference will be in the interests of the State and of the industry.

Important questions of policy, as well as those of domestic concern, that are exercising the minds of those engaged in the industry at the present time were the factors which influenced the Government in convening this Conference.

It is the desire of the Government to obtain an expression of views from the industry upon such subjects.

It is not the intention of the Government that the Conference should go into minute details, nor is it intended to interfere in any way with the duly constituted tribunals functioning in connection with the industry. There are, however, large questions of principle which are vital to the well-being of the industry, and which might be taken into consideration by this Conference.

For instance, the Government has received representations regarding the relationship between the peak year quotas and the areas assigned. As to the Peak Year Scheme: this operated, it will be remembered, as from the 1930 crop, and the principle it enunciated was accepted as part of the 1931 Sugar Agreement between the Commonwealth and the State Governments. It has also been affirmed by the Sugar Associations at their annual conferences; and there is also this point, that, whilst the Peak Year Scheme was put into force by the Government of my predecessor, I recall the fact that, at the request of the industry following the conference last year with the Commonwealth Government at which Senator McLachlan presided, the present Government became a party to it.

Solvent Demand and Increased Productivity.

I have stated on previous occasions that the restriction of production is akin to a policy of despair, and I believe that world progress depends on the increasing of solvent demand and the sharing by all industrious people in the increased productivity that modern methods in industry and agriculture have made available to mankind. The world position, however, must be viewed from those angles that have emerged from time to time. In this respect the world's sugar position is in a deplorable state.

The World Sugar Position—Possible Future Developments.

Recent happenings that may portend developments in the near future are as follows:—

(1) The differentiation in regard to British preference as between sugar from the British Crown Colonies and the Dominions.—It was announced in the 1932 Budget Statement of the British Chancellor of the Exchequer that there would be an increased preference of 1s. per cwt. on all Colonial sugar entering the United Kingdom market during the next five years. No alteration, however, was made so far as Dominion sugars were concerned.

(2) Request from the Sugar Federation of the British Empire by deputation to the British Government in March, 1932 (with which the Acting Agent-General for Queensland was associated)—that the duty on foreign sugar entering the United Kingdom market be increased.—This was found unacceptable to the British Government.

(3) The Ottawa Conference.—The existing preferential margin on sugar in the United Kingdom market was stabilised until August, 1937.

(4) The Beet Sugar Industry.—Information in the Government's possession shows clearly that the Imperial Government is determined to encourage and pursue their policy of assisting by subsidy or otherwise the home beet industry in Great Britain.

(5) The World Economic Conference.—The United Kingdom Government was then anxious for the various sugar-producing countries represented on the Sugar Committee to arrive at some agreement based on the principle of restriction and stabilisation of supplies.

A statement in the House of Commons on 30th November, 1933, by Sir Philip Cunliffe-Lister, the Colonial Secretary, emphasised the British Government's views on the need for sugar regulation. In the course of a considered statement the Colonial Secretary said:—

> "At present the world's potential output of sugar is very largely in excess of the figures of consumption. That excess of productive power is partly held in check by an agreement between the principal exporting countries; but without a continuation and an extension of that agreement, there is a real risk of such an unregulated flow of sugar on the market as will lead to a complete collapse in price."

That statement is one worthy of very serious consideration by the sugar-producing interests of this State. The Agent-General in London has kept the Government fully informed of the overseas position.

The differentiation as between preference on Colonial and Dominion sugars entering the United Kingdom market illustrates an event which might be regarded as a precedent by interested parties, in further limiting the export of sugar from the Dominions to Great Britain.

I may say that in the representation made to the Secretary of State for the Dominions urging that Dominion sugar may be placed on the same basis as sugar from Crown Colonies, a statement was made by Mr. Thomas that the British Government owed a responsibility to these Crown Colonies that did not exist to anything like the same extent in regard to countries having complete Dominion status. Such a differentiation, if continued or enlarged, would intensify our difficulties here. It is not suggested that these things may happen, but reference is made to them to indicate the close touch which the Government is maintaining with the trend of events on the overseas markets. The matters just mentioned were reviewed succinctly in the last report of the Agent-General presented to Parliament last year.

The Difficulty of the Sugar Situation in Queensland.

The Government recognises the difficulty of the position. On one hand, it is claimed from certain areas that the net area assigned by a duly constituted tribunal represents such a quantity of excess sugar as to seriously affect their returns. On the other hand, it is stated that to reverse the position would be to pass on to others not responsible and less able to bear it the loss referred to.

The question of anomalies has been looked into. It is found that certain areas with complaints of unfair treatment—notwithstanding, or because of excess production—have greater tonnages per farmer and greater returns per farmer than certain other districts.

The Price of Sugar—Queensland Opposition to Reduction.

In regard to the price of sugar, the Queensland Government strenuously opposed the reduction made at the instance of the Commonwealth Government, but, in accordance with its practice, acceded to the industry's representations in this connection.

Restrictions and quotas have been advocated and made in respect of such commodities as meat and butter. Restrictions have been effected in regard to these commodities, and further restrictions are indicated from time to time by the central authority in London, so that the policy of definite restriction, or at least control of market conditions, can be regarded as an established fact, whether we like it or not; and we as a Conference must look these facts in the face and shape our policy accordingly.

This brief review will serve to illustrate the position as it exists to-day. It indicates the trend of world events and their relation to sugar supplies from the sugar-producing countries.

The Peak Year Scheme.

The provision of the Peak Year Scheme is associated with the facts as described in this review, particularly in respect to any questions of increasing the peak year tonnage *in toto*.

As to matters under our own control, the Government has had requests for inquiries by tribunals in regard to assignments, peak year,

&c., but we have considered it desirable to take the industry into our confidence and have the benefit of the views expressed at this Conference. A conference, such as has been convened, was responsible for the present system, and within the limits allowed under the Sugar Agreement at present existing between the Commonwealth and the State, the Government seeks to ascertain your views.

The Sugar Embargo.

Then there are other factors—

1. The embargo has been given to the industry on account of the importance of settlement and employment in Northern Australia.

2. The embargo carries with it important obligations in this regard.

3. These considerations must be carefully weighed as against the effect which excess production has upon the financial returns to producers engaged in the industry.

The Conference will undoubtedly recognise the importance of these phases of its deliberations.

Co-operation Essential.

Co-operation in the industry is essential. I ask delegates to cast aside any preconceived ideas, and debate the matter for the advice of the Government and for the ultimate benefit of the industry and the State.

The Premier's address was listened to attentively, and was applauded most cordially.

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

Covered Smut of Barley.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

COVERED smut of barley frequently reduces the yield and, to a more marked extent, the quality of barley crops in Queensland. The disease can first be observed when the plant comes into ear. In the affected plant the grain with its enclosing glumes is replaced by a compact black mass, which consists of countless numbers of minute black spores. When a crop containing diseased plants is harvested, the spores lodge on the unaffected seed and between the adherent glumes of such seed. If seed contaminated with spores is planted, the spores germinate at the same time as the seed and infect the seedling. The infection cannot be observed in the growing plant as it only makes itself apparent just prior to the following harvest.

Control.

The only stage in the life history of the fungus which offers a reasonable opportunity for controlling the disease is that in which the spores are adhering to the grain. If the spores can be destroyed or rendered innocuous by the application of a suitable fungicide to the grain, then no infection could take place. Experiments to determine the best methods of treating the grain for this purpose have been conducted in England,[1] America,[2, 3, 4, 5, 6] and New Zealand[7]. The results obtained showed that the wet treatment with bluestone and dry treatment with copper carbonate, which are in general use for the control of bunt of wheat, were not satisfactory for barley or, rather, were satisfactory only in the case of skinless barley.[8] On the other hand, formalin and a number of solutions containing mercury compounds were found to give good control of the disease. Treatments with dusts other than copper carbonate have been tried with varying success. Those found to be best were Hochst, Abavit B, and Ceresan, the active constituents of which are mercury compounds, and the formalin dust Smuttox. Numerous other mercury dusts, when tested, proved ineffective or only partially effective. Smut can be eliminated from barley seed by treatment with hot water at certain temperatures without destroying the viability of the grain.[7] Considerable apparatus and skill are required for the operation. It can be used for the treatment of a small quantity of seed which can be grown in isolation and the resultant seed, if uncontaminated, used for the following season without treatment. This system has been successfully applied in one district in New Zealand[9] by a seed firm which has the necessary facilities for treatment, growing the treated seed and harvesting the resultant crop without allowing contamination. Detailed discussion of the hot water treatment is not included in these notes, as it is not considered practicable for recommendaion to individual farmers.

Queensland Experiments.

A preliminary trial was carried out in 1931 to test the relative values of a number of methods of seed treatment.[10] Nine of these were included using plots each of a single drill two chains long and replicated six times. The results, though meagre, indicated the ineffectiveness of copper carbonate and suggested that the organic mercury dusts might compare favourably with formalin. This result was followed up the next year by another series of single drill plots, and a second experiment using larger drill-sown plots in which only three treatments were used. The former yielded no results owing to the failure of the plants to mature

under the dry conditions prevailing in the district in which they were sown. The drill-sown plots were planted on Mr. W. Franke's farm at Nobby where they met with more favourable conditions.

The experiment consisted of the comparative trials of three fungicides—formalin used in solution and two mercury dusts—Tillantin R and Abavit B. Approximately one bushel of smutted seed was treated with each and sown in nine plots, three for each treatment. A strip was also planted with untreated smutted seed. The seed was planted on the day after it was treated. The stand obtained in all plots was good, and a count of seedlings in selected areas showed no significant loss of germination for any seed treatment. However, laboratory germination tests started a few days later indicated that the seed treated with formalin deteriorated rapidly after treatment. There was no such effect with the dusts.

At harvest time the untreated plot developed a serious amount of smut. A count of a few sample areas gave the proportion of smutted ears as 7 per cent. This amount would on threshing result in a heavily smutted sample of seed. With formalin and Tillantin R the proportion was reduced to 0·2 per cent., and with Abavit B no trace of smut could be found. The figures below for the number of infected plants in two rows each 12 chains long of each plot give some indication of the relative values of the treatments.

Treatment.	First Plot.	Second Plot.	Third Plot.	Average.
Untreated	215	..	..	215
Formalin	2	1	10	4·3
Abavit B	0	0	0	0
Tillantin R	7	6	6	6·3

These results were striking, and it was decided to attempt to confirm the apparent outstanding value of Abavit B, and to this end a series of trials was carried out in 1933. Drill-sown plots were again put in on Mr. Franke's farm to compare three seed treatments, namely, formalin, Abavit B, and bluestone, and single drill plots on the Roma State Farm.

Single Drill Plots.

In the second experiment the single drill plots were used to test a greater variety of materials and, in some instances, different strengths of the substance. Unfortunately, the degree of infection which developed in this experiment was somewhat low, and as the plots were small and replicated only three times, the results were not as conclusive as could be desired. The experiment demonstrated differences between untreated and treated seed, but failed to sort out the substances which were partially effective from those of greater value. However, it allowed of the making of accurate counts of the germination of the seed after the various treatments. These counts indicated that there was no significant loss of germination with any treatment excepting when formalin was tried at a strength greater than that normally recommended, or with longer periods of immersion. Formalin treatment consisting of the dipping of the seed for ten minutes in a solution of formalin made up at the rate of 1 lb. to 30 gallons of water does not reduce the percentage germination of the seed if it is planted in moist soil on the day following treatment.

The smut developing in the single drill plots indicated that copper carbonate and one of the organic mercury compounds, namely, Tillantin R, are only partially effective against barley smut. Furthermore, Abavit B, which had previously proved very effective when applied at the rate of 2 oz. per bushel, lost its efficiency with any reduction of the amount below this figure.

Drill-sown Plots.

The drill-sown experiment consisted of plots four hoes wide and 12 chains long. Thirty plots were sown, being ten replications of three treatments. A single 12-chain strip the full width of the fourteen-hoe drill was planted with untreated seed along one end of the paddock where it could be conveniently destroyed prior to harvest. A commercial sowing of about seven acres was made with seed treated by the method giving the best results last year, namely, Abavit B at the rate of 2 oz. per bushel. The same seed was used throughout. It was obtained from a lightly smutted crop and had been cleaned and freed from smut balls. No further artificial infection was attempted.

One bushel of seed was used for each of the three treatments for the small replicated plots. The treatments were as follows:—

(1) Bluestone.—The seed was dipped into a 1½ per cent. solution of bluestone for three minutes. It was then spread out to dry.

(2) Abavit B.—The seed was dusted with Abavit B at the rate of 1 oz. per bushel by rotation in a closed box.

(3) Formalin.—The seed was dipped into a 1 : 240 solution of formalin for ten minutes. This solution is equivalent to 1 pint of formalin in 30 gallons of water. The seed was then heaped and covered with a bag which had been soaked in the solution. It was then left overnight and bagged and sown next morning.

Results.

A severe attack of corn-ear worm destroyed a portion of the crop, but sufficient remained to show definite evidence of the value of formalin and of Abavit B used at full strength. Table I. gives the numbers of smutted plants per plot. Table II. gives the approximate percentage of infected plants obtained from the average of these figures, and also estimates of the amount of smut in the commercial planting and in the untreated strip. The estimates for the last two were obtained by counts of areas comparable to the plots, chosen at random through the crop and strip respectively. Corresponding figures for the previous year's experiment are included for comparison.

TABLE I.

Treatment.	Number of Smutted Plants per Plot.										Average.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
Bluestone, 1½ per cent., 3 min.	14	27	21	30	19	20	25	28	16	31	23·1
Abavit B, 1 oz. per bus. ..	17	25	15	23	20	10	21	25	30	21	21·2
Formalin, 1 : 240, 10 min. ..	2	4	1	3	3	1	2	1	0	1	1·8

TABLE II.

Estimated Average Percentage Smutted Plants.

Treatment.	1932.	1933.
Bluestone, 1½ per cent., 3 min. dip	..	0·23
Abavit B, 1 oz. per bus.	..	0·21
Formalin, 1 : 240, 10 min. dip	0·15	0·02
Abavit B, 2 oz. per bus.	..	0·02
Untreated	7·00	4·20
Tillantin R	0·20	..

The degree of control exercised by formalin and Abavit B at the rate of 2 oz. per bushel could be classed as good commercial control. No doubt even better results would be obtained by the use of seed reasonably free from smut in the first instance.

Discussion.

At the conclusion of three years' experiments in the control of barley smut there appear to be two substances of considerable merit, namely, Abavit B and formalin.

The use of the dust Abavit B has several advantages over the liquid treatment with formalin. It has given more consistently good results in the trials. It is easier to apply and has no detrimental effect on the germination of the seed. Formalin probably always slightly retards germination, and will, if incorrectly applied or used under adverse conditions, seriously reduce the total germination. Further, the dust can be applied at any time and the treated seed stored indefinitely; in fact, owing to the protection from weevils afforded by the dust, treated seed is likely to keep better than untreated grain. The risk of recontamination with smut is a factor for consideration when formalin is used, but not for Abavit B, as the latter remains on the grain and will deal as effectively with smut spores received after treatment as with those present before. Treatment with Abavit B does not appreciably alter the rate at which the seed runs through the drill, as does the wet treatment.

The advantages in the use of formalin are the lower cost of materials and the non-poisonous nature of the seed after treatment.

It is proposed to continue the seed treatment trials along two lines, namely, the testing of other methods of treatment with formalin and of mercury dusts other than Abavit B. Certain of these latter have given good results overseas and in preliminary trials in Queensland.

Methods of Seed Treatment.

Abavit B should be applied at the rate of 2 oz. of the powder to each bushel of barley. It should be thoroughly mixed in a rotating, dust-tight container such as is used for the treatment of wheat with copper carbonate. Those unfamiliar with this piece of apparatus can obtain particulars of construction from this Department. Owing to the highly poisonous nature of the dust, all seed treated with Abavit B should be planted to avoid the possibility of its being consumed by domestic animals.

The formalin should be diluted by adding 1 pint of commercial (40 per cent.) formalin to 30 gallons of water. A suitable quantity of the seed should be placed loosely in an open bag and dipped into the solution. It should be stirred to ensure of the wetting of all the grain and allowed to remain in the solution for ten minutes. Excess solution should then be drained back into the container and the seed heaped and covered with bags soaked in the solution. Meanwhile further quantities of seed may be dipped in the same solution, more of the mixture of water and formalin being added to make up for that carried away on the grain. Seed so treated should be sown the following day in a good moist seedbed.

Formalin is poisonous, but after the fumes have evaporated from the seed it is no longer poisoned. Recontamination of the treated grain by the use of smutty bags, &c., should be avoided. The treated seed will not flow through the drill as readily as untreated, so the drill should be set to a higher rate of seeding than that required for the latter.

Acknowledgments.

Special acknowledgment is made of the help received from Mr. W. Franke and Mr. Soutter and the staff of the State Farm, Roma, who provided both the facilities and assistance for carrying out the experiments. Mr. A. C. V. Bligh kindly supplied samples of Abavit B.

LITERATURE CITED.

(1) SALMON, E. S., and WORMALD, H.—An experiment in the treatment of covered smut of barley. Jour. Board Agric. XXIV., pp. 1388-1394, 1918.

(2) LENKEL, R. W.—Further experiments on the control of bunt of wheat and the smuts of barley and oats. Phytopath. XVI., pp. 347-352, 1926.

(3) LENKEL, R. W.—Seed treatment for controlling covered smut of barley. U.S. Dept. Agric. T. Bull, 207, 1930.

(4) TISDALE, W. H., et al.—Experiments with hot water, formaldehyde, copper carbonate and chlorlphol for the control of barley smuts. Phytopath. XII., pp. 153-160, 1923.

(5) TISDALE, W. H., et al.—New seed disinfectants for the control of bunt of wheat and the smuts of oats and barley. Phytopath. XV., pp. 651-676, 1925.

(6) LAMBERT, E. B., et al.—The effectiveness of various fungicides in controlling the covered smut of small grains. Phytopath. XVI., pp. 393-412, 1926.

(7) NEILL, J. C.—Covered smut of barley and its control. New Zealand Jour. Agric. XXXIV., pp. 304-308, 1927.

(8) PORTER, R. H., YU, T. F., and CHEN, H. K.—The response of hulless barley to seed treatment for covered smut and stripe disease. Phytopath. XIX., pp. 657-666, 1929.

(9) HEWLETT, C. H. and J. H.—Hot water treatment of seed barley. Crop results in Canterbury, Seasons 1930 to 1933. New Zealand Jour. Agric. XLVII., pp. 33-34, 1933.

(10) MORWOOD, R. B.—Report of barley smut experiments, 1931. Queensland Agric. Jour. XXXVII., pp. 134-135, 1932.

Bunchy Top of the Banana and its Control.

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

THE occasional outbreak of bunchy top in plantations situated some distance from all known sources of infection makes it imperative that every banana-grower should be familiar with this disease even though it has not been found in his vicinity. The following short account has therefore been prepared for those who are unacquainted with this malady.

How to Recognise Bunchy Top.

A plant which has had bunchy top for some time is easily recognised, since once it has been infected all the new leaves produced take on a characteristic appearance. For example, the youngest leaf unfolds in a somewhat restricted manner. The edges appear to be contracted, so that each side of the blade tends to remain curled upwards and inwards to a greater extent than in the healthy plant. The older leaves, instead of having enlarged and expanded naturally, are seen to be shorter and narrower than normal. They have a margin which is decidedly waved, with usually a pronounced upward curving. These leaves have a stiff appearance, and are brittle when crushed. The leaf stalk is shortened and fails to bend over in the usual graceful way. The combined result is that the short, narrow leaves are borne in a stiff, erect, and crowded manner, from which is derived the name of bunchy top (Plate 73). .

However, no grower should allow a plant infected with bunchy top to remain in his plantation long enough for these advanced stages to be obvious. The plantation should be carefully examined at regular intervals for any plant showing in the slightest degree an abnormal appearance. Especially should the grower investigate plants whose youngest leaves exhibit a lighter green colour along the edge and have blades which dip back from the midrib and curve in again conspicuously from the margin (Plate 74). Any suspicious plant should then be more closely examined for certain characteristic symptoms which are present even in the early stages of the disease. These symptoms are seen by examining the base of the youngest leaf from the under side and with the light behind it. If the plant is infected there will be noticed short, broken, or sometimes continuous lines of a dark-green colour lying between, and parallel to, the clear veins which run out at right-angles to the midrib (Plate 72). There are also often one or more wider dark-green streaks running down the outside of the leaf stalk near its junction with the pseudostem.

Points Concerning the Nature and Spread of Bunchy Top.

Before proceeding to discuss the steps necessary to overcome bunchy top it is important that the reader should know something of the nature of the disease and the means by which it is spread. Bunchy top is unlike the majority of plant diseases, in that it is not caused by a fungus or bacterial organism, but by an infectious agent smaller than any of these—so minute, in fact, that it can not be seen even with a high-power microscope. This causal agent, or virus, as it is commonly called, is located in the sap of an infected plant.

In a single stool the virus from a diseased parent plant may travel in the sap stream down to the corm, and out through the connecting tissue to the young suckers, which will in turn develop the disease (Plate 73). Hence the necessity for two features in the control methods outlined later; namely, the eradication of the whole of the stool rather than merely the plant showing symptoms at the time, and the securing of suckers from bunchy top free plantations.

PLATE 72.

Portions of banana leaves photographed from the underside by both transmitted and reflected light. Above: Leaf from bunchy top infected plant showing the characteristic dark dots, dashes, and lines. Below: Leaf from a healthy plant for comparison.

To transmit bunchy top to a plant in another stool it is necessary to transfer the virus-containing sap from an infected plant to a healthy one. Under natural conditions this is done by the banana aphis when it sucks the sap of a diseased plant and then leaves it to feed on a healthy one. Aphids may travel for considerable distances in the air, which accounts for isolated outbreaks of bunchy top in plantations otherwise free from the disease.

The active part taken by the banana aphis in spreading bunchy top explains why the destruction of all aphids on infected plants is an important part of the control measures discussed below. The banana aphis is so widely distributed that an attempt to control bunchy top by the total eradication of this insect throughout a whole plantation is considered commercially impractical.

Once a banana plant is infected the virus never leaves it. There is no known method of destroying the virus in the plant by the application of chemicals or otherwise, except by destroying the plant itself. In other words, it is not possible to cure a plant of bunchy top.

Plate 73.

The result of not completely eradicating a stool in which bunchy top has appeared. The plant on the right shows primary infection with bunchy top contracted when as a sucker it had direct union with a diseased parent before the latter was removed. The plant on the left is healthy.

The Control of Bunchy Top.

From the foregoing remarks it will be seen that there are two main aspects in the control of bunchy top. Firstly, care must be taken that all suckers used for planting material are free from bunchy top infection. Secondly, the number of bunchy top infected plants must be reduced to the absolute minimum by their eradication as soon as disease symptoms appear. By this means the source of supply of the virus is eliminated.

The Banana Industry Protection Board has been giving considerable attention to the control of bunchy top. The Board's agents are in a

position to advise where suitable material, free from bunchy top, may be obtained. When considering planting, growers should apply to their local agent for information on the planting policy in their district, as a planting permit may have to be refused if it is considered that the spreading of bunchy top or other disease or pest is involved.

For the location of bunchy top plants in his plantation the grower must not depend on the occasional visits of the banana agent, but must himself make regular and systematic search for diseased plants. If an infected plant is found, it and any associated aphids must be immediately destroyed, as otherwise it remains a menace to healthy plants in the same or adjoining plantations.

PLATE 74.

Two banana plants showing the symptoms of a fairly recent infection with bunchy top. In the younger leaves notice the dipping back of the blades from the midrib and the incurved and waved condition of the margin.

In order that the eradication operation may be uniformly effective, the following procedure must be followed. First pour not less than half a pint of pure kerosene into the central leaf of the affected plant, and allow it to trickle down round the leaf bases, so that all aphids present may be killed. After waiting for a few hours for this to take place, dig out the plant, together with any other plants and suckers connected with it in the stool. Finally chop the plants into small pieces to facilitate drying. As a further precaution, the plants associated with the affected one in the stool should also be kerosened before removal.

With strict attention to these matters bunchy top need never become a serious disease, but if the work is allowed to become haphazard, only a disaster such as attended the Currumbin and Tweed growers some years ago may be expected.

Worm Parasites of Domesticated Animals in Queensland.

By F. H. S. ROBERTS, M.Sc., Entomologist, Animal Health Station, Yeerongpilly.

THESE notes are intended as a check list of the worm parasites so far collected from the domesticated animals in Queensland. The majority have already been recorded by Johnston *et al.*, but during the past three years a number of species have been obtained by the writer which had not previously been known from this State. The material examined was obtained mainly from animals slaughtered at the Brisbane Abattoir and from animals used for experimental purposes at this station. A small portion consisted of specimens forwarded from various parts of Queensland for identification. The dog, cat, and horse have, so far, been given very little attention, consequently the parasites recorded from these animals are relatively few.

Nematoda.

Strongyloides sp.—These tiny nematodes are exceedingly numerous in cattle, sheep, and pigs.

Trichuris trichuria (L., 1771).—Very common in the pig and often present in very large numbers.

Trichuris ovis (Abild., 1795).—Frequently found in the cœcum and colon of cattle and sheep.

Capillaria retusa (Raill., 1893).—Very common and numerous in the intestine of the domestic fowl.

Capillaria columbæ (Rud., 1819).—This species has been found in the small intestine of the domestic fowl and domestic pigeon.

Strongylus equinus (Mul., 1780).—Specimens from the large intestine of the horse have frequently been seen and indicate that this species has a wide distribution throughout the State.

Strongylus vulgaris (Looss, 1900).—This species is also a common parasite of the horse, occurring over a wide area.

Strongylus edentatus (Looss, 1900).—This Strongylus does not appear to be as common as *S. vulgaris* and *S. equinus*.

Trichonema sp.—There are at least about ten species of this and allied genera from the horse in the collection. Johnston has recorded *Trichonema tetracanthum*. The Trichonemas are small worms occurring in the cœcum and colon of the horse, and in their immature stages cause nodule formation in the intestinal wall.

Œsophagostomum columbianum Curtice, 1890.—The sheep nodule worm is extremely common and is a widely distributed sheep helminth. The excellent condition of many sheep killed at the abattoir in which the intestines were simply riddled with nodules would indicate that the species is comparatively harmless. Grown sheep certainly appear able to resist infestation by this worm to a large extent, but among young animals the parasite must be regarded as being definitely harmful, the effect of its presence being mainly shown by the failure to make normal growth. The sheep nodule worm is also recorded from cattle and goats

Œsophagostomum radiatum (Rud., 1803).—The nodule worm of cattle is also well distributed and frequently seen.

Œsophagostomum dentatum (Rud., 1803).—This is the common nodule worm of pigs and is considered to be one of the most prevalent worm parasites of this animal in Queensland.

Œsophagostomum longicaudum Goodey, 1925.—This strongyle is only occasionally seen and is usually found in company with *O. dentatum*. It may be readily recognised by the position of the cervical papillæ, by the long tail of the female, and the vase-like shape of the œsophagus.

Ancylostoma caninum (Erc., 1859).—Obtained on several occasions from the dog in Brisbane and Townsville. This hookworm is also frequently found in the cat.

Ancylostoma duodenale (Dubini, 1843).—Recorded by Legg and Rheuben from the intestine of the pig at Townsville.

Necator americanus (Stiles, 1902).—This species is the more common hookworm of man in Queensland and is also recorded from the pig by Legg and Rheuben.

Bunostomum phlebotomum (Rail., 1900).—This cattle hookworm is known from Brisbane and Townsville and is probably well distributed throughout at least the coastal areas of the State. It may be regarded as being a not uncommon bovine parasite, and is thought to be partly responsible for the unthriftiness of calves in areas where it is known to exist.

Stephanurus dentatus (Dies., 1839).—The pig kidney worm is very common and has an extensive distribution throughout the State, its prevalence increasing so rapidly towards the tropical portions that a very large percentage of the animals here are infested. It is responsible for severe liver damage, which results in retarding the growth of the infested animal to a very conspicuous extent. Immature specimens of this helminth have been collected on two occasions from the livers of calves.

Haemonchus contortus (Ru., 1803).—Very common in the abomasum of sheep, cattle, and goats. It is a most pathogenic and widely distributed sheep helminth and is responsible for serious losses yearly. It is also responsible for mortalities and unthriftiness among calves, especially in the coastal areas. In cattle the linguiform process overhanging the vulva in the female is reduced to a small knob.

Nematodirus filicollis (Rud., 1802).—Taken on a few occasions from the small intestine of sheep but not regarded as being a frequent parasite.

Ostertagia circumcincta (Stad., 1894).—Frequently found in the fourth stomach of sheep, rarely in cattle. It has never been seen in large numbers, and is not regarded as a serious parasite.

Ostertagia ostertagi (Stiles, 1892).—This is one of the most frequent cattle helminths in Southern Queensland at least, but heavy infestations have not yet been observed. It has been taken on one occasion from the abomasum of the sheep in company with *O. circumcincta*.

Cooperia curticei (Rail., 1893).—Rare in the small intestine of the sheep.

Cooperia punctata (V. Linstow, 1907).—This species is represented by two males from the duodenum of a calf.

Cooperia pectinata Ransom, 1907.—Dickmans has recently drawn attention to Baylis's *C. nicolli* as a synonym of *C. pectinata*. Baylis erected his species on the larger spicules and ovijectors, the spicules being ·35 to ·39 mm. in length and the ovijectors ·48 to ·60 mm., as against Ransom's measurements for *C. pectinata*, spicules ·24 to ·28 mm. and ovijectors ·3 mm. In the series examined by the writer the spicules measured from ·24 to ·38 mm. and the ovijectors ·31 to ·58 mm. *C. pectinata* was moderately frequent in calves examined at the abattoir.

Cooperia fieldingi Baylis, 1929.—Recorded by Baylis from the small intestine of cattle in North Queensland.

Trichostrongylus extenuatus (Rail., 1898).—Very frequent in sheep though only in small numbers. This species has also been taken from cattle, and is recorded by Heyden from goats.

Trichostrongylus colubriformis (Giles, 1892).—This appears to be the most common species of Trichostrongylus in Queensland sheep. An intense survey would probably record the existence of other species of this genus. *Trichostrongylus sp.* is regarded in the Southern Australian States as an exceedingly pathogenic group, but in Queensland has been seen only in moderate numbers. Heyden records *T. colubriformis* from the goat and man.

Ornithostrongylus quadriradiatus (Stev., 1904).—Occurs in the domestic pigeon.

Hyostrongylus rubidus (Has. and Stiles, 1892).—This slender nematode has been collected on several occasions from the stomach of the pig but never in any numbers.

Metastrongylus apri (Gmel., 1790).—This lung worm of the pig is recorded from the Moreton district. It inhabits the bronchioles.

Chærostrongylus pudendotectus (Wostokow, 1905).—A few specimens of this pig lung worm were obtained from a pig at Riverview in company with *M. apri*.

Dictyocaulus filaria (Rud., 1809).—The large lung worm of the sheep is frequent in Southern Queensland where, during the spring months especially, it is responsible for occasional losses.

Dictyocaulus viviparus (Bloch, 1782).—The cattle lung worm is very prevalent among calves of dairy cattle in Coastal Queensland, especially in the South.

Dictyocaulus arnfieldi (Cobbold, 1884).—Said by Johnston to have been reported from horses by Bancroft in 1893.

Oxyuris equi (Schrank, 1788).—Very common in the large bowel of horses.

Heterakis gallinæ (Gmel., 1790).—Very frequent in the cæcum of the domestic fowl.

Ascaris lumbricoides (L., 1758).—One of the commonest and most widely distributed parasites of the pig.

Toxocara canis (Werner, 1782).—This species is very prevalent in the small intestine of dogs.

Toxocara mystax (Zedor, 1800).—Frequent in the small intestine of the cat.

Ascaris equorum Goeze, 1782.—Very frequent in the small intestine of the horse.

Ascaridia lineata (Schneid., 1866).—Very common in the domestic fowl, especially in young birds.

Ascaridia columbæ (Gmel., 1790).—Found in the small intestine of the domestic pigeon, and regarded as being very frequent.

Habronema megastoma (Rud., 1819).—Occurs in the stomach of the horse.

Habronema microstoma (Schneid., 1866).—Found in the stomach of the horse.

Habronema muscæ (Carter, 1861).—This is the most frequently encountered of the three species of this genus. Johnston, who worked out the life histories of the three species in Queensland, found that *H. musca* and *H. megastoma* may be transmitted by *Musca domestica, M. vetustissima, M. fergusoni, M. terræ-reginæ,* and *M. hilli;* whilst *H. microstoma* underwent its complete larval development only in *Stomoxys calcitrans.*

Arduenna strongylina (Rud., 1819).—Very common in the stomach of the pig, but seen only in small numbers.

Physocephalus sexalatus (Mol., 1860).—Frequently seen in the stomach of the pig, usually accompanied by *A. strongylina.*

Acuaria (*Cheilospirura*) *hamulosa* (Dies., 1851).—Frequent in the gizzard of the domestic fowl.

Acuaria (*Dispharynx*) *spiralis* (Mol., 1858).—Infrequent in the proventriculus of the domestic fowl.

Oxyspirura parvovum Sweet, 1910.—The eye worm of the domestic fowl is extremely common in North Queensland, but is unknown south of Rockhampton. The intermediate host of this nematode is the roach *Pycnocælus surinamensis.*

Filaria lienalis (Stiles, 1892).—Recorded by Johnston as *Onchocerca lienalis* from the gastro-splenic ligament of cattle. The species has recently been placed in the genus *Filaria* by Sandground. It is not uncommon among Queensland cattle.

Onchocerca gutterosa Neuman, 1910.—Rheuben considered this species to represent the unincapsulated form of *Onchocerca gibsoni,* but in a recent revision of the genus Sandground gives it specific rank due to the constant presence of an inconspicuous dilation in the cervial region which is absent in *O. gibsoni.* Rheuben reports *O. gutterosa* as being extremely common, the principal sites of infection in the forequarter being the connective tissue of the *ligamentum nuchæ,* and in the subscapular connection tissue, and in the hind limb in the connective tissue below the quadriceps group of muscles and in that of the popliteal space.

Onchocerca gibsoni C. and J., 1910.—The beef nodule worm is very common and is a source of serious loss to the beef export trade. The worm is found in the region of the brisket and stifle. This species is also recorded from sheep.

Dirofilaria immitis (Leidy, 1856).—Recorded by Bancroft from the right ventricle of the dog. This filariid is said by Legg to be very common among dogs in North Queensland. Bancroft records the mosquito *Culex fatigans* as an intermediate host.

Gnathostoma hispidum Fedchenko, 1872.—This species is found in the stomach of the pig, and is represented in the collection by two specimens from the Cape York Peninsula.

Macracanthorhynchus hirudinaceus (Pallas, 1781).—The thorn-headed worm of the pig is occasionally but not frequently observed. It appears to be most common in the Beaudesert district.

Trematoda.

Paramphistomum cervi (Schrank, 1790).—This conical fluke is extremely common among cattle, especially in the coastal areas. It occurs sometimes in very great numbers in the rumen and has occasionally been seen in the reticulum, but does not appear to be in any way pathogenic. It is possible that more than one species of the genus is included here under this name.

Fasciola hepatica L., 1758.—The liver fluke has frequently been collected from the livers of cattle and sheep and on two occasions from that of the pig. There is now definite evidence that this fluke is endemic in the Maleny and Kingaroy districts in Queensland. In the Maleny district infestation of the few sheep there is comparatively common, whilst at Kingaroy the parasite was taken from the liver of a pig raised in the district. There is evidence that the species may also occur around Milmerran, but this is not conclusive. The molluscan intermediate host has not yet been determined.

Echinostomum revolutum (Frölich, 1802).—Obtained on one occasion from the rectum of the domestic duck. This species has been previously recorded from the black swan (*Chenopsis atrata*), the pied goose (*Anseranas semipalmata*), the green gooseteal (*Nettopus pulchellus*), and from the black duck (*Anas superciliosa*).

Cestoda.

Moniezia expansa (Rud., 1810).—Very common among lambs, especially on the Darling Downs, among which it may be pathogenic. This species is also recorded from calves and goats.

Moniezia benedeni (Moniez, 1879).—This tapeworm has been collected from calves. It may be distinguished from *M. expansa* by the larger scolex and the linear interproglottidal glands.

Moniezia trigonophora St. and Has., 1892.—Recorded by Johnston from sheep.

Moniezia planissima St. and Has., 1892.—Recorded by Johnston from cattle. The many species of *Moniezia* recorded by Stiles and Hassell from domestic ruminants have now been reduced to three, and it is probable that Johnston's *M. trigonophora* may be referred to *M. expansa* and his *M. planissima* to *M. benedeni*.

Helictometra giardi (Moniez, 1879).—Collected on several occasions from lambs in company with *Moniezia expansa*. Specimens have been taken at Miles, Dalby, Goondiwindi, and Springsure.

Anoplocephala perfoliata (Goeze, 1782).—Recorded by Johnston from the horse.

Anoplocephala magna (Abildg., 1789).—This is a much larger species than *A. perfoliata* and may be readily distinguished by the absence of posterior lappets on the scolex. The several specimens in the collection would denote that this horse tapeworm is not uncommon.

Dipylidium caninum (L., 1758).—There are several specimens from the dog bearing this label. The majority of these are minus the scolex and have only been given this name provisionally. This species has been recorded from the cat by Johnston in which it is not uncommon.

Echinococcus granulosus (Batsch, 1786).—Hydatid cysts are not uncommon in the liver and lungs of sheep, cattle, and pigs slaughtered at the abattoir. It may be inferred that the adult is present in dogs in Queensland.

Tænia hydatigena (Pall., 1776).—The larvæ of this dog tapeworm are very common in sheep and to a lesser extent in cattle and pigs. Its presence in dogs may be inferred from the incidence of its larva, *Cysticercus teniucollis.*

Tænia tæniaformis (Rud., 1810).—Johnston records this species from the cat. Its larva, *Cysticercus fasciolaris,* occurs in the livers of rats.

Tænia saginata (Goeze, 1782).—The beef tapeworm has been recorded from man on several occasions, but no record is known of the presence of its larva, *Cysticercus bovis*, in cattle. The species is probably not endemic.

Davainea proglottina (Dav., 1860).—This tiny tape is not infrequently found in the small intestine of the domestic fowl. Heavy infestations are not uncommon and are regarded as being markedly pathogenic.

Raillietina (Raillietina) tetragona (Mol., 1858).—Occurs in the small intestine of the domestic fowl and is the commonest fowl tapeworm in Southern Queensland.

Raillietina (Skrjabinia) cesticillus (Mol., 1858).—Fairly frequent in the small intestine of the domestic fowl.

Hymenolepis carioca (Magahl., 1898).—The incidence of this tapeworm in the domestic fowl is not regarded as high, though heavy infestations have occasionally been observed.

Hymenolepis inermis Yoshida, 1910.—Not uncommon in the domestic fowl, often occurring in large numbers.

Aporina delafondi (Rail., 1892).—Recorded by Johnston from the intestine of the domestic pigeon.

Diphyllobothrium mansoni (Cobbold, 1882).—This tapeworm is of frequent occurrence in the small intestine of the cat.

Fimbriaria fasciolaris (Pall., 1781).—Two specimens of this interesting tapeworm were obtained from a domestic duck in Brisbane. In both specimens the head was replaced by a pseudoscolex.

Host List with Parasites Recorded.

SHEEP (*Ovis aries*).

Fasciola hepatica.
Moniezia expansa.
Moniezia trigonophora.
Helictometra giardi.
Cysticercus tenuicollis.
Echinococcus granulosus.
*Strongyloides sp. (papillosus?).
Hæmonchus contortus.
Ostertagia circumcincta.
*Ostertagia ostertagi.
*Cooperia curticei.
Trichostrongylus extenuatus.
*Trichostrongylus colubriformis.
*Nematodirus filicollis.
Oesophagostomum columbianum.
Dictyocaulus filaria.
Trichuris ovis.
Onchocerca gibsoni.

Cattle (*Bos taurus*).

Paramphistomum cervi.
Fasciola hepatica.
Moniezia expansa.
Moniezia planissima.
*Moniezia benedeni.
Cysticercus bovis?
*Cysticercus tenuicollis.
Echinococcus granulosus.
Hæmonchus contortus.
*Ostertagia ostertagi.
Ostertagia circumcincta.
*Cooperia punctata.
Cooperia pectinata.
Cooperia fieldingi.
Trichostrongylus extenuatus.
*Trichostrongylus colubriformis.
Dictyocaulus viviparus.
*Stephanurus dentatus.
Oesophagostomum radiatum.
Oesophagostomum columbianum.
*Bunostomum phlebotomum.
*Strongyloides sp.
Trichuris ovis.
Filaria lienalis.
Onchocerca gutterosa.
Onchocerca gibsoni.

Pig (*Sus scrofa*).

*Fasciola hepatica.
*Echinococcus granulosus.
*Cysticercus tenuicollis.
*Strongyloides sp.
Ascaris lumbricoides.
*Oesophagostomum dentatum.
*Oesophagostomum longicaudum.
Ancylostoma duodenale.
Necator americanus.
*Metastrongylus apri.
*Chærostrongylus pudendotectus.
*Hyostrongylus rubidus.
Stephanurus dentatus.
Arduenna strongylina.
Physocephalus sexalatus.
*Gnasthostoma hispidum.
Trichuris trichuira.
*Macracanthorhynchus hirudinaceus.

Goat (*Capra hircus*).

Echinococcus granulosus.
*Moniezia expansa.
*Hæmonchus contortus.
*Oesophagostomum columbianum.
Trichostrongylus colubriformis.
Trichostrongylus extenuatus.

Horse (*Equus caballus*).

Anoplocephala perfoliata.
*Anoplocephala magna.
Ascaris equorum.
Oxyuris equi.
Strongylus equinus.
*Strongylus vulgaris.
*Strongylus edentatus.
Trichonema tetracanthum.
Trichonema sp.
Dictyocaulus arnfieldi.
Habronema muscæ.
Habronema microstoma.
Habronema megastoma.

Dog (*Canis familiaris*).

Dypilidium caninum.
Echinococcus granulosus.
Tænia hydatigena.
Ancylostoma caninum.
Dirofilaria immitis.
Toxocara canis.

Cat (*Felis domestica*).

Diphyllobothrium mansoni.
Tænia tæniæformis.
Dipylidium caninum.
Toxocara mystax.
Ancylostoma caninum.

Fowl (*Gallus*).

Davainea proglottina.
Raillietina (Raillietina) tetragona.
Raillietina (Skrjabinia) cesticillus.
Hymenolepis carioca.
Hymenolepis inermis.
Amœbotænia sphenoides.
Ascaridia lineata.
Heterakis gallinæ.
Capillaria retusa.
Capillaria columbæ.
Oxyspirura parvovum.
Acuaria (Cheilospirura) hamulosa.
Acuaria (Dispharynx) spiralis.

Pigeon (*Columba livia*).

Aporina delafondi.
Ascaridia columbæ.
Ornithostrongylus quadriradiatus.
Capillaria columbæ.

Duck (*Anas boschas domestica*).

*Echinostomum revolutum.
*Fimbriaria fasciolaris.

* Officially reported from these hosts for the first time in Queensland.

REFERENCES.

Bancroft, T. L. (1901). Preliminary notes on the intermediate host of *Filaria immitis*, Leidy. Proc. Roy. Soc. N.S.W. xxxv., pp. 41-46.

Baylis, H. A. (1929). A Manual of Helminthology, Medical and Veterinary, London.

Baylis, H. A. (1929). Two new species of *Cooperia* from Australian cattle. Mag. Nat. Hist. Vol. iv., pp. 529-530.

Brown, W. (1926). A worm new to Queensland. Qld. Agri. Journ., Vol. vi. (n.s.), p. 11 and p. 76.

Dikmans, G. (1932). *Cooperia nicolli*, Baylis, 1929, a synonym of *Cooperia pectinata*, Ranson, 1911. Note in Jour. Paras. Vol. xix. (1).

Foster, W. D. (1912). The roundworms of domestic swine, with special reference to two species parasitic in the stomach. U.S. Dep. Ag., Bur. Ani., Ind., Bull. 158.

Gordon, McL. Hugh (1932). Some helminth parasites reported from Australia for the first time with a description of *Cooperia McMasteri* sp. nov., from a calf. Aust. Vet. Jour., Vol. viii., No. 1.

Heyden, H., and Green, R. (1931). Some worm infestations of man in Australia. Med. Jour. Aust., Vol. 1, No. 21.

Johnston, T. H. (1916). A census of the endoparasites recorded as occurring in Queensland; arranged under their hosts. Proc. Roy. Soc. Qld., Vol. xxviii., No. 2.

Johnston, T. H. (1918). Notes on miscellaneous parasites. Proc. Roy. Soc. Qld., Vol. xxx., No. 16.

Johnston, T. H. (1920). The life history of *Habronema* in relation to *Musca domestica*, and native flies in Queensland. Proc. Roy. Soc. Qld., Vol. xxxii., No. 5.

Johnston, T. H. (1921). Onchocerciasis of Queensland cattle. Trans. Roy. Soc. Sth. Aust., Vol. xlv.

Kanzal, G. (1931). A survey of the helminth parasites of swine in New South Wales. Aust. Vet. Jour., Vol. vi., No. 2.

Legg, J., and Rheuben, J. A. (1921). Notes on the finding of *Ancylostoma duodenale* in the intestines of the pig. Med. Jour. Aust., Vol. ii., p. 398.

Legg, J. (1924). Ann. Rep. Dept. Agric. Queensland.

Ransom, B. H. (1907). Notes on parasitic nematodes, including descriptions of new genera and species and observations on life histories. U.S. Dep. Agric. Bur. Ani., Ind. Circ. 116.

Rheuben, J. A. (1930). Some observations on the *Onchocerca gibsoni* in its unincapsulated form in Queensland cattle. Qld. Agric. Jour., Vol. xxxiii., Part 5.

Roberts, F. H. S. (1932). A survey of the helminth parasites of the domestic fowl and domestic pigeon in Queensland. Qld. Agric. Jour., October.

Ross, I., and Kanzal, G. (1931). *Monodontus phlebotomus* and *Oesphagostomum venulosum*. Two important parasites of cattle and sheep, recorded from Australia for the first time. Aust. Vet. Jour., Vol. vii., pp. 25-27.

Sandground, J. H. (1932). A review of the taxonomy in the genus *Onchocerca* Diesing (Filariidæ). Eighth Ann. Meeting, Amer. Soc. Paras. Abs. in Jour. Paras., Vol. xix., No. 2.

Sweet, G. (1909). The endoparasites of Australian stock and native fauna. Proc. Roy. Soc. Vic., 21 (n.s.), Pt. ii., pp. 454-502.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the Journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

Improvement of Stock.

In the course of a recent statement to the Press, the Minister for Agriculture and Stock, Mr. Frank W. Bulcock, said:—

TO promote production, without increasing production costs, is an aim much to be desired. Recognising this, the Government has recently given consideration to methods whereby better results will be possible of attainment in relation to dairying, pig-raising, lamb-growing, and the production of heavy horses.

Present economic conditions indicate the need for more efficient means of production, and one of the best methods of attaining efficiency in production is by the use of stock selected because of some outstanding characteristic of economic importance. Hence, it follows that the employment of high-grade sires, representing as they do the head of the herd or flock, as the case may be, will add materially to our total wealth production, while at the same time benefiting the individual engaged in production.

In the scheme now approved by the Government there is an earnest desire to promote this efficiency in production, and it is recognised that many farmers do not employ indifferent sires because they desire to do so, but in consequence of an inability to buy more suitable stock.

In the case of the dairying industry, a greater volume of production from a small herd is possible, and in departmental experience has been often achieved. The advances now contemplated, which will be made through the Rural Assistance Board, will materially help dairy farmers generally to acquire a better class of bull.

Turning to beef, with the ever-increasing competition for available markets, and the undeniable fact that we must strive to attain the highest levels reached by our competitors, it is evident that some action to assist in providing good herd bulls is necessary. It is anticipated that cattle-growers will avail themselves of the opportunities afforded under the scheme.

From time to time complaints are raised concerning the decline of heavy horse standards, and in view of the fact that the future of the heavy horse appears to be assured, provision is made for assistance to purchase Clydesdale stallions, either individually or through groups.

The looked-for development of the lamb trade cannot take place until financial assistance is forthcoming, particularly for the purchase of rams of the British breeds.

The raising of pigs has also in recent years indicated clearly the need for the attainment of a high standard of quality.

Generally speaking, the proposals outlined in the scheme should make it possible for every live-stock raiser to possess a high-grade animal, which will soon reflect its characteristics in more efficient and, therefore, more economical production.

RURAL ASSISTANCE SCHEME.

Following are particulars of the rural assistance scheme:—

Dairy Sires.

(i.) Qualifications.—Advances to be made only in respect of bulls, either registered or eligible for registration in a recognised herd book, the progeny of dams which have qualified on a production basis.

(ii.) Valuation.—The limit of valuation shall be 20 guineas, plus 2s. per lb. butter-fat over the production standard to be placed on such bulls.

(iii.) Advance.—The total advance to be 75 per cent. of 20 guineas, plus 75 per cent. of the additional purchase price accruing in respect of production records.

(iv.) Term of Loan.—Maximum five years, an interest period of twelve months and a redemption period of four years.

(v.) Age of Bull.—Nine months to five years; provided that in special cases the Board may approve of an older animal.

(vi.) Security.—Stock mortgage, assignment, or such other security as the Rural Assistance Board may require.

(vii.) Health.—T.B. test to be carried out in respect of bulls over two years of age. C.A. test to be at the discretion of the Minister.

(viii.) Group Purchases.—Any such applications received to be dealt with on their merits by the Rural Assistance Board.

Sheep.

To encourage the early lamb industry advances may be made for the purchase of up to 100 merino ewes and two rams of British breeds. In the case of established flocks, advances may be made for the purchase of up to ten British-breed rams (on a 2 per cent. basis). The valuation of rams to be 50 per cent. of 5 guineas, plus 50 per cent. of freight. The basis of advance to be 50 per cent. of landed cost. The loan to be for a maximum of four years, an interest period of twelve months and a redemption period of three years.

Security.—Stock mortgage and wool lien, if practicable. In particular cases the security to be at the discretion of the Rural Assistance Board.

Beef Bulls.

Qualification.—Bulls to be registered or eligible for registration in recognised stud book, or the progeny of registered bulls from pure-bred cows.

Valuation.—Maximum of 75 guineas per bull. Maximum advance 150 guineas, or in special circumstances advance to be at the discretion of the Rural Assistance Board.

Advance.—Seventy-five per cent. of landed cost.

Term of Loan.—Maximum five years, interest period one year, redemption period four years.

Security.—Stock mortgage or such other security as may be required by the Rural Assistance Board.

Age of Bulls.—One year to three years.

Health.—T.B. test to be conducted in respect of bulls over two years. C.A. test to be at discretion of Minister.

Stallions.

Qualifications.—Advance to be granted in respect of Clydesdales only, approved by the Stallion Board.

Advance.—Fifty per cent. of cost, and such advance shall not exceed £150.

Term of Loan.—Maximum five years, interest period one year, redemption period four years.

Age of Stallion.—Three to five years. provided in special cases advances may be made for older or younger animals at the discretion of the Board.

Security.—Stock mortgage and insurance. Applications are to be considered on the basis of suitability and requirements of a district.

Group Purchases.—Similar conditions in respect of stallions as defined in respect of the individual are to apply to group purchases, but in which case personal guarantees may be required from the group or the show committee for security.

Boars.

Qualifications.—Advances to operate in respect of Berkshires, Tamworths, Large and Middle Whites, registered or eligible for registration in a recognised herd book.

Advance.—Fifty per cent. of landed cost, such advance not to exceed £7 10s.

Term of Loan.—Maximum two years, interest period six months, redemption period eighteen months.

Age of Pig.—Four months to two years.

Security.—Stock lien or such other security as may be required by the Rural Assistance Board.

An application fee of 5s. will be required in respect of applications under the scheme.

If an applicant should buy a sire, stallion, ram, or boar above the maximum valuation shown, he will be required to defray the excess amount. The Board will advance 50 per cent. or 75 per cent. only on the valuations shown in the foregoing.

THREE-HORSE TACKLE.

The diagram of three-horse tackle is designed to do away with two swingle-trees. A rack is furnished in the middle of the main swingle-tree to alter the leverage, if necessary. The rest of the arrangement is plain to a practical man.

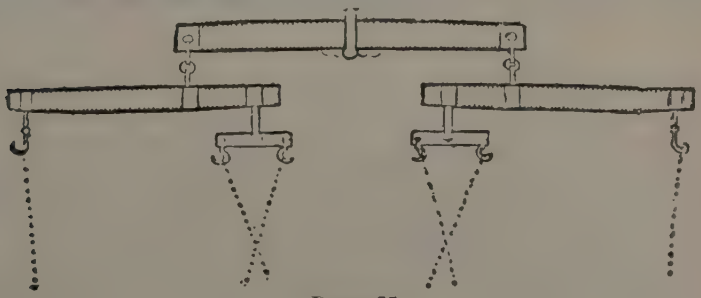

PLATE 75.

Harvesting Cotton.

By R. W. PETERS, Cotton Experimentalist.

THE harvesting of cotton is one of the important operations connected with the production of this crop. Not only is it the most expensive item, the total cost per acre amounting, when good yields are obtained, to as much as £7 sterling on a piece rate per lb. basis, but the way in which the crop is harvested has a decided effect on the quality of the resultant lint produced. Investigations in the United States of America have shown that the fewer cleanings cotton receives during the ginning operations the less damage will be done to the fibres. It has likewise been shown in England that the fewer cleaning operations the fibres have to be subjected to in the spinning processes the better suited they will be for the economical production of yarn of high quality. It can be appreciated, therefore, that the harvesting of a cotton crop should be done carefully, and every factor adversely affecting the quality of the lint should be guarded against.

Picking Cotton.

One of the most important points to observe is not to pick cotton either when it is wet from exposure to rain or when it is green, as fibres are called before the bolls have been open long enough to let the fibres dry out thoroughly.

Not only is it difficult to clean leaf and trash out of cotton in either condition, but during the ginning operations the saws cut the wet fibres very badly, and also tend to leave them in a twisted, ropy state. Lint of this nature is easily detected, and the buyers penalise it heavily, for much waste is obtained from such cotton during the spinning operations. Wet cotton is difficult to gin, and in some types of ginneries it interferes with the delivery of the lint from the saws to the bale press. In the wetter districts of the United States of America it has been found necessary to devise special apparatus to dry the seed cotton before ginning, and the quality of lint obtained from cotton treated in such manner is raised at least a whole grade. In most seasons in Queensland no difficulty should be experienced with wet cotton, for the usual climatic conditions are suitable for the harvesting of dry cotton after the dew has evaporated. Where picking is done while the dew is still present the wet cotton should be spread out in the sun during the forenoon, after which it can be baled with the rest of the picking of the day. It is not necessary to dry the cotton which is picked after the dew is off, providing "green" cotton is not included.

In the earlier years of the present phase of cotton-growing in Queensland, the ginneries were equipped with cleaning apparatus which was not as efficient as that now installed, and it was necessary to pick the cotton rather cleanly in order to obtain high-grade lint from it. As the premiums between grades were then fairly large most growers endeavoured to send in clean cotton, and this tended to slow up the rate of picking. With the present more efficient machinery it is not necessary to have the cotton as nearly "snow-white" as many growers used to send it in order to obtain the best grades. This is particularly true where the farmer and his family pick the crop, and it is suggested in

such cases that it would be better to pick the cotton slightly less cleanly, and therefore more quickly, for not only could greater tallies be obtained in the time available each day for harevsting the crop, but larger acreages could be grown and still be harvested without employing labour.

In this respect it is pointed out that in a normal season in cotton picked prior to the occurrence of heavy frosts, the bracts and pieces of leaf are fairly tough and pliable, and do not break up into small pieces as happens after they become brittle from the effect of frosts. Early picked cotton can thus contain a fair amount of big leaf and still yield lint of high grade, for the cleaning machinery removes the big leaf without breaking it to any extent. It is a mistake, therefore, either to pick so carefully as to have little leaf or, worse still, to roll the cotton between the hands to break up the large leaf. It is the small pieces of leaf which are difficult to remove, and seed cotton containing fine pieces, or "pepper" leaf, as it is termed, have to be graded lower than cotton with big leaf. This is the reason the grades usually drop off after heavy frosts occur—the dead leaves and bracts are so brittle that they break into small pieces when picked with the cotton, and while the improved cleaning machinery eliminates the major portion of them it is impossible to remove all, hence the necessity of grading the seed cotton lower than if the pieces of leaf were large and not brittle.

Plate 76.—Cotton Crop Fully Opened.

Cotton in this condition should not be left for any length of time, for exposure to the elements may result in serious damage and general deterioration of the crop.

The most difficult matter to remove from the cotton lint is grass and weed seed, especially spear grass seed, and every effort should be made to clean the fields at the last cultivation so that no seed will be produced. On old cultivations, even where good farming practices have been followed, there is always danger of tall-growing weeds in the rows setting seed late in the season, and it pays to chop out such weeds before the harvesting commences, especially if pickers are employed.

Preserving the "Bloom" of the Crop.

Another important point when harvesting cotton is to guard against leaving the cotton exposed too long to the weather. Cotton, when the bolls first open, has a nice richness of colour, or "bloom," as it is termed, and it is necessary for a sample of cotton to have this "bloom" before it can be graded into the higher grades of the regular universal standards, although it may be free of trash. When cotton is left unpicked for several weeks the bloom is lost through the bleaching action brought about by the nightly wetting of the dews and the subsequent drying by the sun. This changes the colour to a chalky dead-white and also destroys the lustre of the fibres. The effect of storms on cotton is worse than the dews—the colour changes to a dull greyish tinge, and even to a light bluish tinge when rains lasting several days are experienced. When rains do occur cotton should not be picked for several days, for the bleaching action of the dews and sun greatly improves the colour, while wind and heat fluffs out the fibres from the matted condition caused by the rain. This greatly improves the appearance of the lint, and raises both the lint and seed cotton at least a half-grade. The grower thus benefits in two ways by delaying picking after a storm until the cotton has improved in appearance. The cotton is of more value, and no payment is made for picking moisture.

Effect of High Winds.

Another reason for not delaying the picking of cotton too long is the effect of winds on a well-opened crop. With the continuous movement of the plants in windy weather the locks tend to hang out of the bolls in a long, stringy condition. This not only allows the cotton to dry out excessively, thus losing weight and adversely affecting the character of the fibres, but also makes the cotton difficult to gin properly, owing to a considerable proportion of the locks being in a twisted, rope-like condition. Cotton left exposed to windy weather also usually gathers up bits of broken bracts and leaves, especially if severe frosts have occurred. It is difficult to clean such trash in the ginneries, for the smaller pieces are generally twisted in amongst the fibres. In addition to these disadvantages, much greater loss of crop onto the ground occurs in heavy storms in wind-blown cotton than where picking is done at proper intervals. It can be appreciated, therefore, that the opened crop should not be left unpicked too long. Where the harvesting is done by the grower and his family it will pay to make several pickings in a good crop, depending on the season. Where labour is employed it has to be remembered that sufficient bolls must be open to allow the picker to make a reasonable tally, otherwise the cost of picking will necessarily be higher. Generally speaking, it has been found satisfactory when employing labour to make one good picking and then a clean-up in fields of light to medium yield, and two pickings and a clean-up in good crops. The grower should be guided by the conditions as they exist. Sometimes it is better to allow a heavy picking to open and thus get it picked cheaper than if a lighter picking was made, and cotton of a higher quality obtained.

Snapping.

Cleaning machinery is now installed at the Glenmore and Whinstanes ginneries for treating snapped cotton. Snapped cotton is obtained by snapping or jerking the whole burr and contents from the plant, and should be practised only after heavy frosts have been experienced.

The method originated in sections of the United States of America during a season of labour shortage, and the cheaper harvesting costs obtained quickly brought about the general use of the system, especially in places and seasons with high picking rates and early killing frosts. Cleaning machinery was soon evolved to remove the burrs, extra leaf, and parts of the plant gathered in the snapping operations. Undoubtedly the method is of decided value under many conditions, and especially so in Queensland in harvesting the top crop. It is pointed out, however, that snapping should not be substituted for picking cotton that has not been well frosted. Snapping unfrosted bolls tears the plant badly, and the cotton when packed in containers for forwarding to the ginnery "sweats" so that it is difficult to clean and gin. In addition to this, freight is paid for green, wet burrs, leaves, and portions of the plant instead of light, dead material. Snapping mature cotton undoubtedly lowers the grade to the point where the full value of the lint cannot be obtained. On the other hand, snapping the top crop of bolls, which usually contain cotton of the lower grades not only does not lower the grades materially, but enables a considerable amount of cotton to be harvested cheaply which would often not have been picked. Only bolls containing marketable cotton should be snapped, however. During this past season a considerable percentage of dry, hard, diseased bolls, or "hickory nuts," as they have been termed, were forwarded in the late snapped cotton. As these contain no cotton and are removed in the cleaning machinery before the seed cotton is weighed, the grower pays the pickers for nothing of value, and the Cotton Board pays unnecessary freight, thereby reducing the amount of the later payments. Snapping is of value to Queensland cotton growers, but should be used properly.

Packing Cotton.

Owing to the distance of the cotton fields from the ginneries in Queensland the crop is forwarded by train either in bags or wool packs containing around 80 to 100 lb. and 500 lb. of seed cotton, respectively. The growers of small acreages generally use second-hand corn bags, &c., while those with more than 5 or 6 acres usually purchase once-used wool packs for their crop. It is cheaper to use the wool packs, for grower's individual ones are returned for a small fee which covers cost of freight and heating to kill the pink boll worm or any cotton pests in them.

Clean Containers Necessary.

It is pointed out that before filling a container it should be cleaned carefully to remove everything that might affect the grade of the cotton, and wool packs which have had cotton in them should be especially cleaned in order to protect the purity of seed. Growers should pay particular attention to this feature, for undoubtedly much contamination of pure seed varieties can be brought about by the admixture caused through bits of seed cotton sticking in the corners of bales and attached to strands of the sewings along the edges, &c.

Uniformity of Grade in Every Bale.

When packing a container every care should be taken to have only the one grade and staple of cotton in it. A bale of lint is sold on the basis that it contains cotton of uniform grade and staple length. If there is any variation of content encountered it is purchased on the basis of the lowest grade and shortest staple contained. It is necessary,

therefore, for the growers to assist in every way possible in obtaining uniformity of contents of the bale of lint. Where cotton is forwarded in bags the extra sampling done in determining the value of sufficient cotton to make a bale of lint and the better mixing of the small lots, enables uniform bales to be ginned. Very careful mixing has to be done of some wool packs received, however, owing to the layers of cotton of different grades pressed in them. Many large growers have the pickers empty their picking sacks directly into the wool pack, and where this is done layers of markedly different grade often result, owing to some pickers picking trashy cotton. It is recommended that the contents of each bag should be roughly graded by the grower and an endeavour made to segregate the different grades in his cotton into separate wool packs. The grading at the ginneries could then be done more quickly, in that it would not be necessary for the grader to stop and estimate the true value of a wool pack owing to the different grades of seed cotton contained in it as is now frequently done, and in addition more uniform cotton would be fed to the gins, thus enabling the production of bales of lint containing only one grade in each.

It is most important that growers should pay more attention to forwarding containers with uniform contents, and it is strongly recommended that some effort be made to grade the cotton before putting it into wool packs, and blending before putting it into bags. Usually two and in some fields three grades would be ample, for with the exception of droughty spots or places of rank growth, the quality of the crop over a field, if picked in a short time, is more or less the same. By having a bale each for good grade, leafy cotton, and cotton which is insect stained or from droughty spots in the field, a grower, especially with a large acreage, would not only obtain the full value of his crop, but would be forwarding containers of uniform contents, thereby assisting the industry generally.

Forwarding Cotton.

Every grower has a registered number, and should include this with his initials and railway station in a brand for identifying each container he sends. The brand should be placed in a conspicuous place on the side of the container in black that will not rub or wash off. Each season a number of wool packs are received at the ginnery which have no identification marks, or the brands are so indistinct that they are not legible, and it is only through checking up the advice notes which a grower despatches to the Cotton Board when forwarding his cotton, that the ownership can be established. This slows up the work at the ginnery and should not occur, for it is a simple manner to brand the cotton carefully.

Grading.

When the container of seed cotton arrives at the ginnery the contents are examined by a grader, who first determines the grade. "Grade" means a combination of the colour, body, and strength of the cotton and the amount of trash or foreign matter in it. The grades used in grading seed cotton are based on the Universal Standards for American cotton, which are recognised in all official cotton exchanges. The grader then determines the length of the fibres, or staples it, as the operation is termed. Each container is then weighed and check-weighed and checked against the amount of cotton the grower states on his advice note he is sending to the ginnery; after which it is segregated into the proper

stack for ginning according to the grade and staple. When the cotton is being ginned two samples are drawn from each 500-lb. bale of lint in such a way as to represent the true contents. These are labelled and sent to the classing room where another grader grades and staples them under an even light. Each bale is classified against a set of lint standards based on the key set of Universal Standards for American cotton that are obtained from the United States Department of Agriculture every time new reference sets are made. The true contents of each bale of lint are thus known, and also the grade and staple of each container of seed cotton from which the bale of lint was obtained. This enables the grader of the seed cotton to check on his classifications throughout the season and thus ascertain if the seed cotton is producing lint of the quality he has estimated.

The grower can thus see that every care is being taken to prepare his produce so that the full value will be obtained for it. Being graded on the accepted Universal Standards it can be readily sold in any cotton consuming country. As acclimatized seed of suitable varieties is supplied through a scheme of seed development controlled by the Department of Agriculture and Stock, the grower has the means of producing cotton of high quality, and it has been thoroughly demonstrated that where proper cultural systems are carefully followed the Queensland cotton grower can produce an article which is satisfactory in all respects.

PIPE WRENCH.

When a large pipe wrench is needed, but not available, one can be quickly improvised by using a small wrench in connection with a chain, as illustrated. The

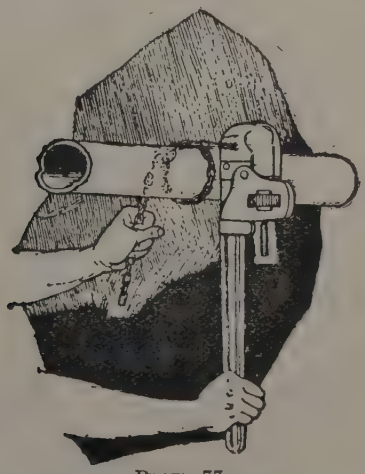

Plate 77.

chain is wrapped around the pipe, one end is gripped in the jaws of the wrench, and the other held in the hand. Pulling on the wrench tightens the chain so that the pipe can be turned.

Pasture Requirements and Composition.

By E. H. GURNEY, Agricultural Chemist.*

THE wealth of the Australian Commonwealth is largely derived from primary products, and particularly is this the case in the State of Queensland. These primary products are dependent on pasture growth; in fact it has been stated that more than three-quarters of the monetary value of Queensland's exports is derived from glasslands.

From this it will be seen how important it is that all information obtainable regarding pastures should be utilised in order that greater production of all primary products be attained, and that at the lowest cost.

That extensive research work is required in connection with the pastures of Queensland is well known, but mention should be made that information of economic value regarding some of these pastures has been obtained and widely published and that, although some have made use of such information in their pasture management, many owners of similar pasture have not. This matter will be referred to later.

That some attention was paid to pasture in early times will be seen from the following interesting extract taken from an article—"The History of Pasture Analysis," by William Davies[1]:—

> "Worlidge[2] in his "Systema Agriculturæ: the Mystery of husbandry" (1687), considers at some length the management of pastures and refers to the sowing of ray grass (= perennial rye grass), St. Foyn (Sainfoin), and la lucerne (= lucerne) for the purpose of providing hay and fodder. He makes no reference whatever to specific examination of the resultant herbage crop. Similarly, Marshall[3] (1788), refers to methods for improving grasslands, but makes no suggestion relative to herbage analysis. Sinclair[4] (1824), provides valuable information regarding the leading grassland outlook of his day. His own work, together with that carried out in collaboration with Sir Humphry Davy, lays the foundation for combined agronomic and chemical studies on individual British grasses and clovers."

From this it is seen that pasture has been studied from early times, but from about the beginning of this century what may be termed a special detailed pasture investigational period has occurred, and that such pasture study has been world-wide, covering humid to arid climatic conditions.

During the later period mentioned there have been, no doubt, a number of reasons for the particular interest taken in grass study, but the main reasons, it is considered, have been the importance of making practical use of the fact that great variation in composition of grass occurs at different stages of growth, and that when the feed-value of grass is being considered the amount and composition of its mineral content has also to be taken into very definite account.

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* In a radio lecturette from Station 4QG.

Before describing the variation in composition of some of our grasses, brief mention may be made of the functions of some of the food ingredients—e.g., proteins, fibre, and mineral matter—contained in grasses and other feeding stuffs.

Proteins are complex nitrogenous bodies existing in grasses and foodstuffs, and are used by animals for building up the proteins contained in the muscle, flesh, and blood of their bodies. For the purpose of making flesh, &c., the young growing animal will require a relatively large amount of protein in its feed, whilst the mature animal requires the protein for repairing waste in the body, and particularly is an extra supply of protein required by an animal producing milk.

Some quantity of fibre in foodstuffs is useful in giving bulk to the food and in aiding to a certain extent digestion. Different animals require different amounts of fibre in their rations. The digestion and evacuation of fibre necessitates the use of some energy by the animal; therefore the extent to which fibre in any foodstuff is digestible is of importance.

Mineral matter is required by the animal for bone formation, in maintaining the normal condition of blood and other body fluids, and particularly in mineral matter required by animals producing milk.

The more recent work upon grass and grassland has shown that malnutrition of stock is caused, in many cases, by insufficient or improperly balanced mineral matter in the grass feed, and that even when distinct evidence of malnutrition is not apparent that low production or ill-health may be caused by some mineral deficiency.

A few examples showing the difference in composition of plants at different stages of their growth will now be given, but it must be understood distinctly that all the figures quoted are calculated upon the analyses of "water-free material" contained in the plants.

	Water-free Material.				Remarks.
	Crude Protein.	Crude Fibre.	Lime.	Phosphoric Acid.	
Paspalum ..	20·6	23·7	·41	·61	Short young grass
Ditto ..	5·7	35·2	·54	·33	Old stemmy growth
Rhodes grass ..	16·4	27·1	1·19	·72	Young leafy grass
Ditto ..	5·8	33·3	·58	·60	Old stemmy growth
Mitchell grass ..	17·1	30·9	1·0	·53	Young
Ditto ..	8·76	39·7	·56	·49	Midgrowth
Ditto ..	4·02	43·4	·46	·24	Mature
White clover ..	29·9	16·9	1·56	1·18	Young leafy growth
Ditto ..	18·1	22·1	2·07	·52	Old growth
Lucerne ..	29·4	17·0	1·97	1·01	Young preflowering growth
Ditto ..	18·4	32·6	3·54	·67	Old mature growth
Phalaris tuberosa	25·9	19·6	·50	·34	Short young grass
Ditto ..	10·8	27·7	·81	1·13	

These figures are not the extreme limits of variation in composition that may occur in plant growth, for in the very young growth of a number of forage plants a protein content of 33 per cent. and more occurs, whereas, on the other hand, in old matured growth, such as

grass roughage, the crude protein content may be about 1 per cent., together with less than on-tenth of 1 per cent. of phosphoric acid.

That young pasture growth has a very high feed value and is in a digestible condition has been stated in many publications, but it is considered that this fact has not had the practical recognition in Queensland that its value deserves.

In our climate, owing to most of the seasonal rain falling during the warmer months of the year, a very prolific and rapid growth of grass ocurs. A very large proportion of this flush growth in the younger and highly nutritious stage is not consumed by stock, but continues to grow to maturity and ultimately becomes roughage of more or less low feed value. Thus it is that a large amount of highly nutritious foodstuff is not made use of, and it is important that serious consideration should be given by all stock owners to methods for the economical use of such valuable foodstuff. Suitable methods for the utilisation of young paspalum growth have been established and put into practical use with success by at least some owners of dairy stock in Queensland.

It has been demonstrated that after mowing and removal of roughage followed by treatment with suitable "renovators" even old established paspalum pasture will give heavy yields of fresh young growth when fertilized with 1 cwt. of ammonium sulphate and 2 cwt. of superphosphate per acre. This young growth may be utilised by a system of "rotational grazing," or by repeated mowings harvested, and conserved as hay or ensilage.

The fertilizing of grass and feeding-off in the young stages of growth is of particular value when the soil is deficient in phosphoric acid, and a large number of our coastal soils have a poor phosphoric acid content. The fertilizing of these pastures also induces increased clover growth which, as mentioned before, when young has a very high lime and phosphoric acid content.

The best results from all grass varieties may not be obtained by a method of repeated mowings or intensive grazing. Experiments with Rhodes grass dealing with this matter are being conducted.

In the case of Mitchell and Flinders grass, the making of hay with these grasses, when not too matured, would appear to be the most suitable method for the conservation of a certain amount of flush growth. Very fine samples of sweet smelling Mitchell and Flinders grass hays have been analysed and found to contain relatively high amounts of protein and low fibre.

From what has been said it is apparent that young grass growth is material of high feed value, and as it is produced upon the farm or holding it is cheaper than bought foodstuff of equal food value, and failure to make the most use of it means loss of profit.

Mention has not been made in connection with some different methods of pasture improvement, such as the introduction of the best grass strains and legumes into some of our grasslands, but it is generally recognised that such improvements would be of very great economic value.

Reference has mostly been made to the high food value of young grass growth, but it is considered that some stock owners place too much reliance upon the feeding value of old matured grass. It should

be fully recognised that this dependence upon old grass will result in lower production by all kinds of stock, particularly in the case of introduced high-grade stock, and in many cases through malnutrition will cause the stock to become liable to disease.

REFERENCES.

1. William Davies, "The History of Pasture Analysis," from "Agricultural Progress," Vol. X., 1933.
2. J. Worlidge, "Systema Agriculturæ; The Mystery of Husbandry."
3. Wm. Marshall, "The Rural Economy of Yorkshire."
4. G. Sinclair, "Hortus Gramineus Woburnensis."

QUEENSLAND SHOW DATES, 1934.

March.

Allora, 7th and 8th
Clifton, 14th and 15th
Millmerran, 20th
Tara, 21st
Goombungee, 28th
Boonah Camp Draft, 31st March and 2nd April

April.

Pittsworth, 4th and 5th
Warwick, 10th to 12th
Toowoomba, 16th to 19th
Rosewood Camp Draft, 7th
Goondiwindi, 27th and 28th
Oakey, 28th
Taroom Camp Draft, 30th

May.

Taroom, 1st and 2nd (Camp Draft, 5th)
Dalby, 3rd and 4th
Beaudesert, 2nd and 3rd
Nanango, 3rd and 4th
Blackall, 7th to 9th
Chinchilla, 8th and 9th
Charleville, 8th to 10th
Crow's Nest, 9th and 10th
Boonah, 9th and 10th
Monto, 9th and 10th
Kingaroy, 10th and 11th
Ipswich, 15th to 18th
Miles, 16th
Kilkivan, 16th and 17th
Mitchell, 16th and 17th
Mundubbera, 16th and 17th
Dirranbandi, 16th and 17th
Wondai, 17th and 18th
Roma, 22nd to 24th
Gympie, 23rd and 24th
Emerald, 23rd and 24th
Biggenden, 24th and 25th
Murgon, 24th to 26th
Toogoolawah, 25th and 26th
Kalbar, 26th
Goomeri, 29th and 30th

June.

Maryborough, 1st, 2nd, and 4th
Marburg, 1st and 2nd
Childers, 5th and 6th
Gin Gin, 5th and 6th
Bundaberg, 7th to 9th
Lowood, 8th and 9th
Bororen and Miriam Vale, 11th and 12th
Wowan, 14th and 15th
Rockhampton, 19th to 23rd
Mackay, 26th to 28th
Laidley, 27th and 28th
Proserpine, 29th and 30th
Townsville Rodeo, 30th

July.

Bowen, 4th and 5th
Gatton, 4th and 5th
Kilcoy, 5th and 6th
Ayr, 6th and 7th
Townsville, 10th to 12th
Woodford, 12th and 13th
Rosewood, 13th and 14th
Cleveland, 13th and 14th
Cairns, 17th to 19th
Charters Towers, 18th and 19th
Caboolture, 20th
Nambour, 18th and 19th
Atherton, 24th and 25th
Pine Rivers, 27th and 28th

August.

Royal National, 6th to 11th
Home Hill, 31st August and 1st September

September.

Enoggera, 1st
Imbil, 7th and 8th
Ingham, 7th and 8th
Innisfail, 14th and 15th
Beenleigh, 20th and 21st
Mareeba, 20th and 21st
Rocklea, 22nd
Malanda, 26th and 27th
Kenilworth, 29th

October.

Millaa Millaa, 5th and 6th
Tully, 12th and 13th

The Pig Farm.

ACCOMMODATION AND EQUIPMENT.

By L. A. DOWNEY, H.D.A., Instructor in Pig Raising.

The lively interest taken in progressive pig raising in Queensland in recent years has led to an increased demand for information on the layout and equipment of modern piggeries. Articles on the subject have been published in this Journal from time to time, the last one appearing in our issue for August, 1932. This paper, besides being a revision of former articles by the same author, contains much new material, including plans of pens and a portable shelter prepared by the Public Works Department from sketches supplied by the Pig Branch, and which should be very useful to farmers contemplating improvement of their piggery accommodation, as well as to others about to enter the pig-raising industry.—ED.

ALTHOUGH the pig is a fairly hardy animal it is, in these days, more than a scavenger, it is a pork-producing machine which is kept by the farmer to convert certain foods into edible pork, the farmer's object being to have his pork-producing machine working at the highest degree of efficiency—that is, he wants to have his pigs growing rapidly on the least amount of food and producing good quality meat. Of course, breeding and feeding are two important factors in pork production, but accommodation and management are equally important; the pork machine cannot function efficiently unless it is well cared for. In our comparatively mild climate there is no need for elaborate housing for pigs, as is the case in some colder climates, but still the pig should be provided with sufficient shelter from the extremes of the weather.

Where pigs are kept as a side line on the farm, their accommodation is sometimes very neglected, but there is no good excuse for this, for even when there is little money available for building the piggery, it can still be built along proper lines provided a little thought is given to the planning of the yards, sheds, and paddocks; if not well planned but just allowed to grow, the piggery will become a muddle. The old idea that the piggery was a dirty and objectionable place has now disappeared and the pig is given his rightful place on the farm either in a nice grassy run or in a well-kept concrete pen.

Speaking in a broad way, it may be said that there are only two satisfactory methods of keeping pigs, one is on pasture, and the other is in concrete pens, anything between these two systems such as a bare earth sty or yard is unhygienic and therefore unsatisfactory. Every pig raiser should decide whether his conditions are most adapted to paddockings pigs or penning them on the intensive system.

The grazing of pigs either on permanent pasture paddocks which can be grazed and spelled in rotation, or on crop paddocks where a succession of forage crops can be provided and the soil cultivated periodically, has many advantages—the pig lives in a natural condition and is contented, it has a healthy atmosphere and abundant sunlight which tends to promote health in the animal. If the grazing is good, the

pigs will obtain a portion of their food and may be encouraged to do their own harvesting, thus saving labour. When pigs are grazing there is little risk of them suffering from mineral or vitamin deficiency. Rotational grazing and cultivation of pig paddocks is one of the most practical means of controlling worm infection in pigs which threatens to become a serious problem in pig production. The present requirements

PLATE 78.
A well-planned piggery at Dalby with intensive pens and a number of grazing paddocks provided with Pepperina trees for shade.

of the pork and bacon trade are for lean meat, and it is easier to produce lean, fleshy porkers and baconers if they are grazed than if they are confined in small pens. Most agricultural and dairy farm piggeries can be conveniently laid out for paddocking pigs, and the best plan is to have three or more small paddocks of half an acre or more each which can be ploughed at any time.

Some pig farms, such as buttermilk piggeries, slaughter-yard piggeries, and suburban pig farms, are not suited for grazing pigs, and so in such places the intensive system of housing is recommended. On these places large numbers of pigs are kept on comparatively small areas and for sanitation it is necessary that they should have impervious floors such as concrete with a wooden section to camp on.

After having decided on the class of pig accommodation to suit the particular conditions, the farmer should survey the extent to which the pig section of the farm may grow, and then plan the whole undertaking on a definite system. He should estimate the number of breeding sows he is likely to run, and the room required to accommodate them and their progeny up to porker or baconer stage.

The amount of land required for grazing pigs will naturally depend on the climate, the class of land, whether it is cropped with heavy-yielding

crops or grassed, and the nature and amounts of other foods available for the pigs. Pig pasture paddocks should be rested from the pigs or cultivated when they begin to get bare, so they should be sufficiently subdivided to allow of rotational grazing. In subdividing pig paddocks, it is an advantage to make the runs long and narrow so that by the use of a short length of temporary fencing a portion of the paddock can be partitioned off for the stock to graze on, and when this is cleaned up the temporary fence may be moved to give the pigs a fresh piece of the crop.

Adjoining the pig paddocks there should be a lane leading to a loading race to provide for convenient loading of the pigs.

Plate 79.

Pigs give best results when run on good pasture.

Where pigs are grazed in paddocks, movable equipment such as sheds and troughs will be found most convenient in all but very hilly country. The sheds and troughs may be built on skids for easy transport by a horse team or tractor. The advantages of movable equipment over stationary sheds and troughs are that, when pigs are being concentrated in one particular paddock to feed off a crop, sufficient sheds and troughs may be easily taken with them; also when the ground around the troughs and sheds becomes fouled, as it does after a time, they may be shifted and the ground allowed to sweeten. Where permanent troughs are built in pig paddocks they should be made of concrete and be built into a concrete floor which can be drained and kept clean.

When given a good paddock and plenty of food pigs do not as a rule try to break through fences, and it is a rule that the larger the paddock the lower and less substantial the fence required to keep the pigs in. The many types of woven wires and barbed wire make good pig paddock fences. If there is any natural shade in the runs the pigs will only require the shelter of the sheds in extreme weather, and therefore the sheds need not be elaborate or expensive.

The size of the sheds or huts required in the paddocks will depend on the number and class of pigs it is desired to house, but a useful size is 8 feet by 8 feet floor space and the roof should be about 6 feet from the floor so that a man can easily work inside the shed and so that the pigs may keep cool in them on a hot day. With a floor 8 feet by 8 feet there is ample room for a sow and litter or for about ten growing pigs. The class of material to be used in the construction of the sheds will depend on their availability and cost. The floor should be set on two strong skids, which not only keep the floor boards dry, but also provide for easy transport of the shed.

For intensive housing of pigs the camping shed can be built the same as the shelter shed for paddocked pigs, but there should be a small run adjoining which has a sloping concrete floor and a good drain; a reliable water supply should be provided at such piggeries so that the pens may be washed and kept in a sanitary condition. The troughs in the intensive pens may be movable or they can be of concrete built into the floor. Where practicable the pigs sheds should be so placed that the early morning sun rays will penetrate right inside as the sun is a good and cheap disinfectant. The front of the shed should be at least partly open to allow the sun rays entrance.

Legislation.

Pig raising is controlled by legislation under the Pig Industry Act, Dairy Produce Act, Diseases in Stock Act, and the Slaughtering Act, and the by-laws of city, municipal, and shire councils. While it is advisable when about to construct or alter a piggery, to consult the authorities concerned, through the district inspectors under the Acts, it might be stated here that the general purposes of the legislation in force are to provide for health and sanitation on the premises where pigs are kept. They do not aim at hindering progress or at increasing the cost of production.

Situation.

In selecting a site for the piggery, consideration should be given to the aspect so as to provide shelter from the prevailing winds, and to make the best use of the early morning sun as a disinfectant and deodoriser inside the sheds; thus a north-easterly aspect will usually be found the most suitable for pig accommodation.

It is an advantage to have the pig paddocks on a slope to provide surface drainage. It is required by the Dairy Produce Act that the piggery should be situated at least 150 feet from dairy yards and buildings. Where separated milk is to be used for pig feeding, the farmer should endeavour to have the piggery and dairy so situated that the separated milk may be conveyed in a line of open fluming from the separator-room to the piggery so as to save unnecessary labour which would otherwise be involved in carrying or wheeling the milk to the pigs.

The available water supply, shade, and proximity to cultivation land are other points to be considered.

A Suggested Layout.

The plan of a piggery shown in Plate 80 suggests a layout which has proved very satisfactory where suitable cultivation or grazing land is available. This plan gives scope for cultivation and rotational grazing

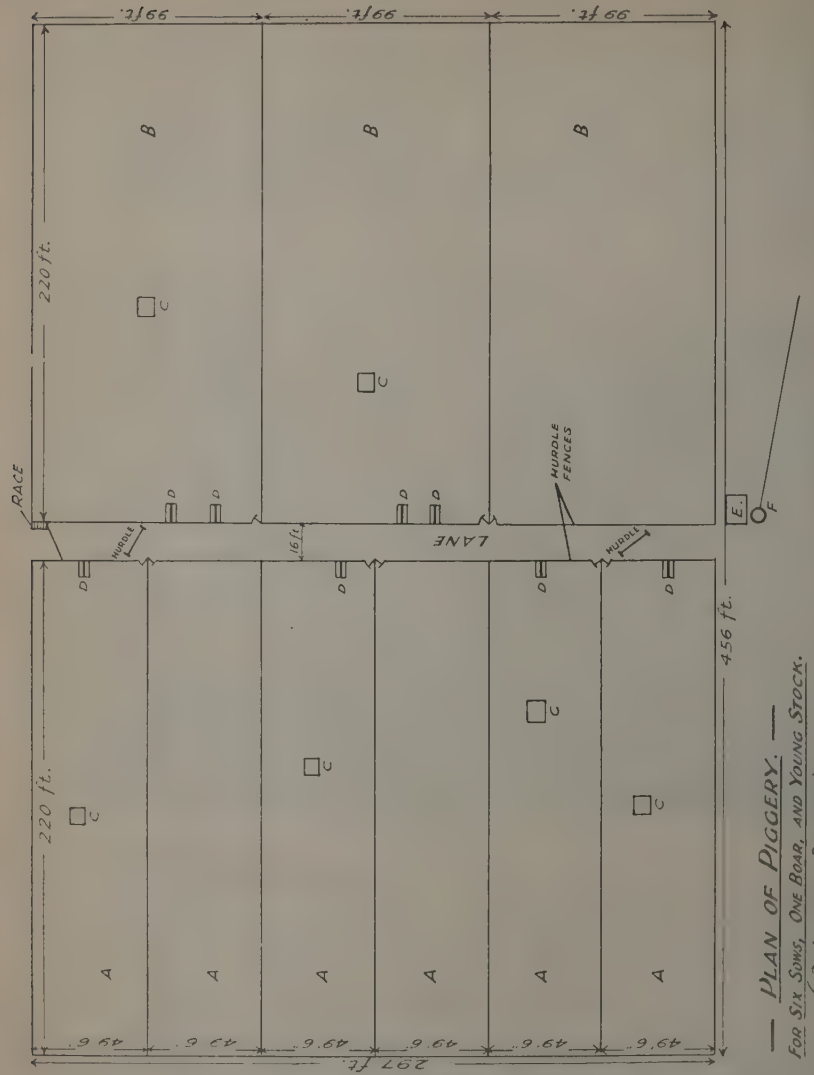


FIGURE 3.

— PLAN OF PIGGERY. —
FOR SIX SOWS, ONE BOAR, AND YOUNG STOCK.
(3 ACRES OF PASTURES.)

PLATE 80.

(*a*) Indicates paddocks of ½ acre each for the use of dry sows, sows with litters, and the boar. At most times two of these paddocks could be under cultivation and later be grazed in rotation.

(*b*) Indicates paddocks of ½ acre each in extent to be used for growing pigs. As one paddock could usually be spared they can be cultivated and grazed in rotation.

Six movable sheds (*c*) should be sufficient shelter for the pigs, as these may be moved from one paddock to another as required.

Troughs built on movable platforms (*d*) will be found convenient if drawn against the fence and moved along as the surrounding ground becomes fouled.

(*e*) Shows the feed shed.

(*f*) Shows the milk tank connected by a line of fluming from the separator-room.

of paddocks with a view to providing a maximum of pasture for the pigs and control of disease and parasites. The lane in the centre of the runs with a loading race at one end and two movable hurdles provides ample facilities for drafting pigs.

The usual fencing should be replaced by movable hurdles at the ends of the runs adjoining the lane so that when paddocks are being cultivated implements may work right to the end of each run, for it is this portion around the troughs which becomes most fouled.

All sheds and troughs should be constructed on skids so that they may be moved when required to keep the runs in a sanitary condition.

It is not suggested that pigs will obtain all their food from the three acres of grazing shown in this plan, and the grazing can only be expected to carry the pigs if other foods such as grain and milk or grain and meatmeal are provided in addition.

Where the correct type of pig is bred and feeding conditions are good, pigs may be kept in paddocks, as suggested, from birth to slaughter with excellent results.

PLATE 81.
Intensive pig pens in use at the Animal Health Station, Yeerongpilly.

Quarantine Pen.

It is advisable to provide a quarantine pen some distance from other pens, where newly-introduced pigs and sick pigs could be placed and kept under observation. This is an important safeguard against disease.

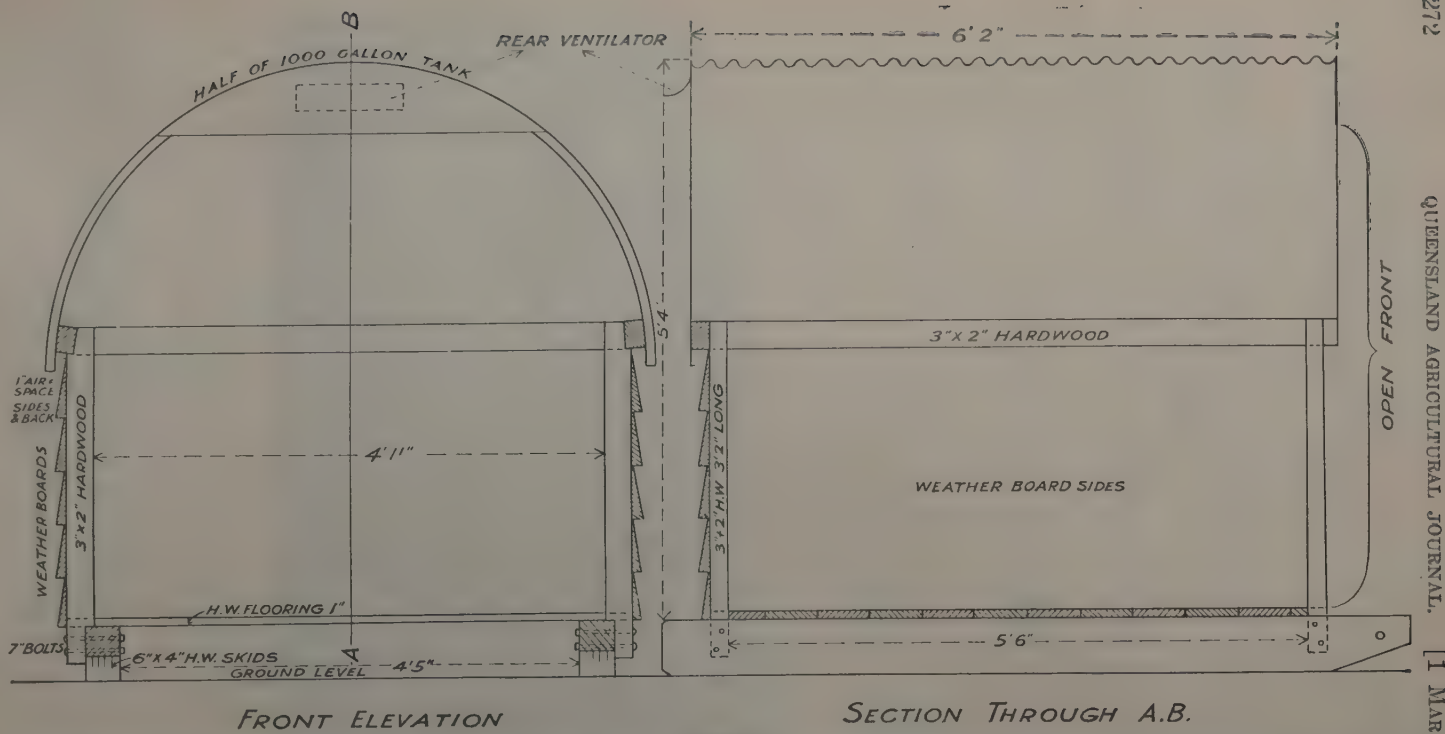


PLATE 82.

Plan of a portable shelter shed, using half a water tank. Note skids on which this shed is constructed, providing for ready means of moving the house when required.

PLATE 83.
A half-tank shed in use at the St. Lucia Training Farm.

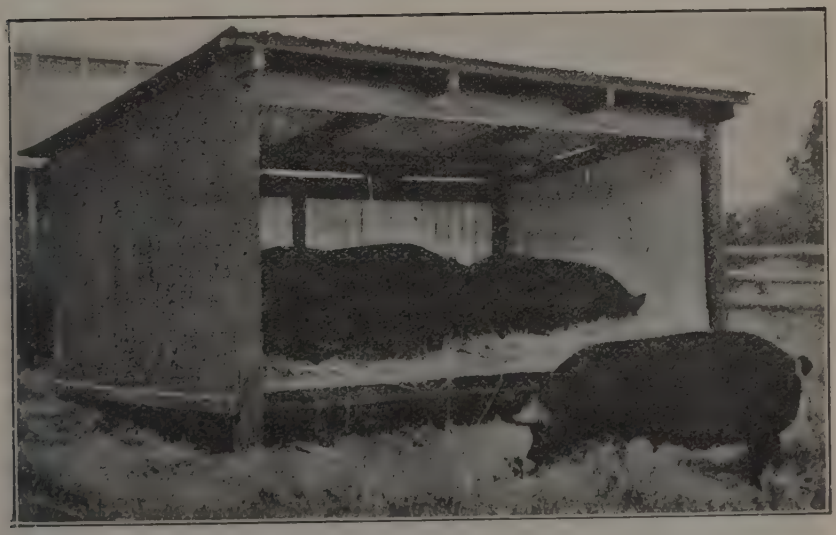


PLATE 84.
An open-fronted shelter shed for use where the movable shed is not practicable.

Guard Rail.

All farrowing houses should be fitted with a guard rail to prevent young pigs from being crushed against the walls. Experience has proved that the use of this rail has saved an appreciable percentage of young pigs. This rail can be constructed of 3-inch by 2-inch hardwood, 1-inch water piping, or saplings. It should be placed 9 inches above the floor and 7 inches from the walls.

PLATE 85.
Woven wire pig fencing. Note the shade provided.

PLATE 86.
Straight saplings may be put to good use in pig fencing.

Fences.

The class of fence to be used on each farm will be governed mainly by the available material for its construction.

Pig fences need to be from 2 feet 6 inches to 4 feet in height, depending on the class of pigs to be enclosed. Large boars and sows sometimes have a tendency to jump fences, and for such animals a

Plate 87.
Another durable pig fence.

4 feet fence would be necessary; however, a fence 3 feet high is usually sufficient to control pigs of all sizes, while young pigs are usually kept in their places by 2-feet 6-inch fences. To overcome this difference in the required heights of fences, posts should be 4 feet out of the ground so that the height of the fence may be raised to 4 feet, if necessary, by the use of extra barbed wires.

With pig pens, it is a fairly constant rule that the smaller the pen the more substantial the fences must be; the reverse also holds. It is usually advisable to have a line of barbed wire, either on the ground level or a few inches below, to prevent pigs from rooting under fences; logs or stones can sometimes be used for the same purpose.

Where wire fences are used it is advisable to either reinforce them or replace them by wood at the feeding end of the paddocks, as there is most wear and tear on this part of the fence.

Troughs.

The piggery should be equipped with troughs of sufficient capacity to feed the pigs without undue scrambling or fighting at feeding time. An average space of 10 inches should be allowed for each adult pig. The trough should have the capacity to hold a full feed for the pigs.

Pig troughs should be strongly constructed and have a smooth surface free from corners or cracks. Where portable troughs are made they should be of a size which allows of their being easily carried on to clean ground. With stationary troughs it is essential that they should be built on to a floor of concrete, brick, or timber to prevent the pigs from making an objectionable mud wallow beside the trough. Wooden slabs placed on the ground beside the feeding trough are very insanitary, even if they do keep the pigs out of the mud.

The most serviceable troughs are of concrete built into a concrete floor as shown in Plates 88 and 90.

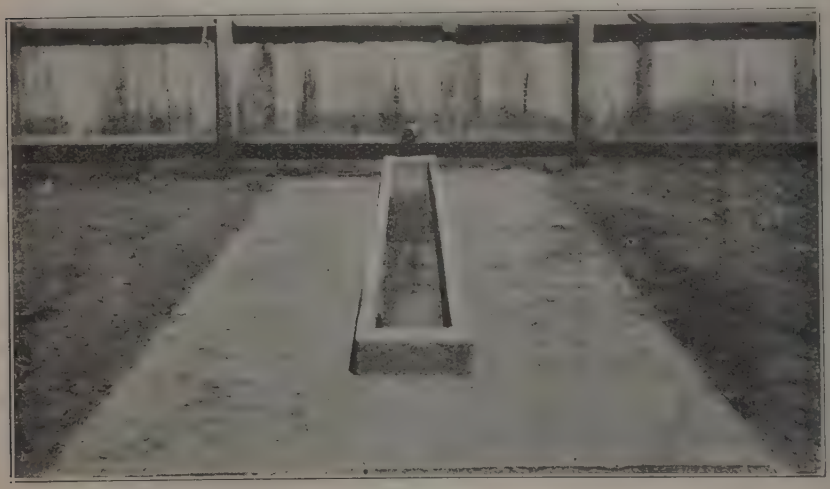


PLATE 88.
Concrete food trough and platform.

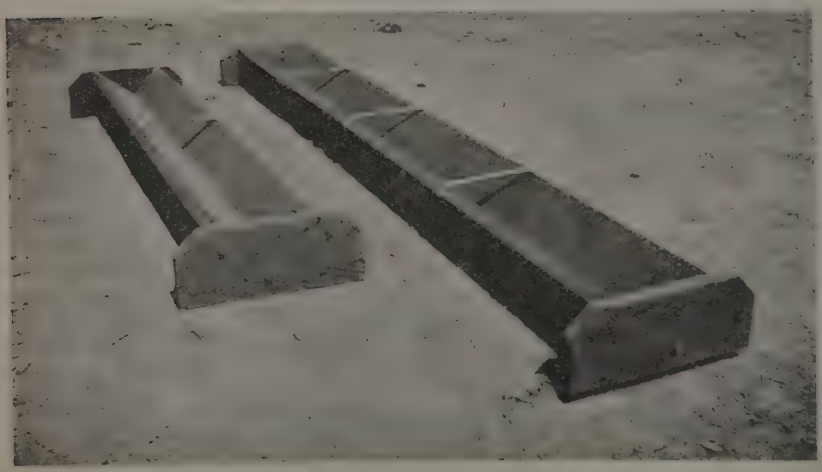


PLATE 89.
Handy V-shaped wooden troughs.

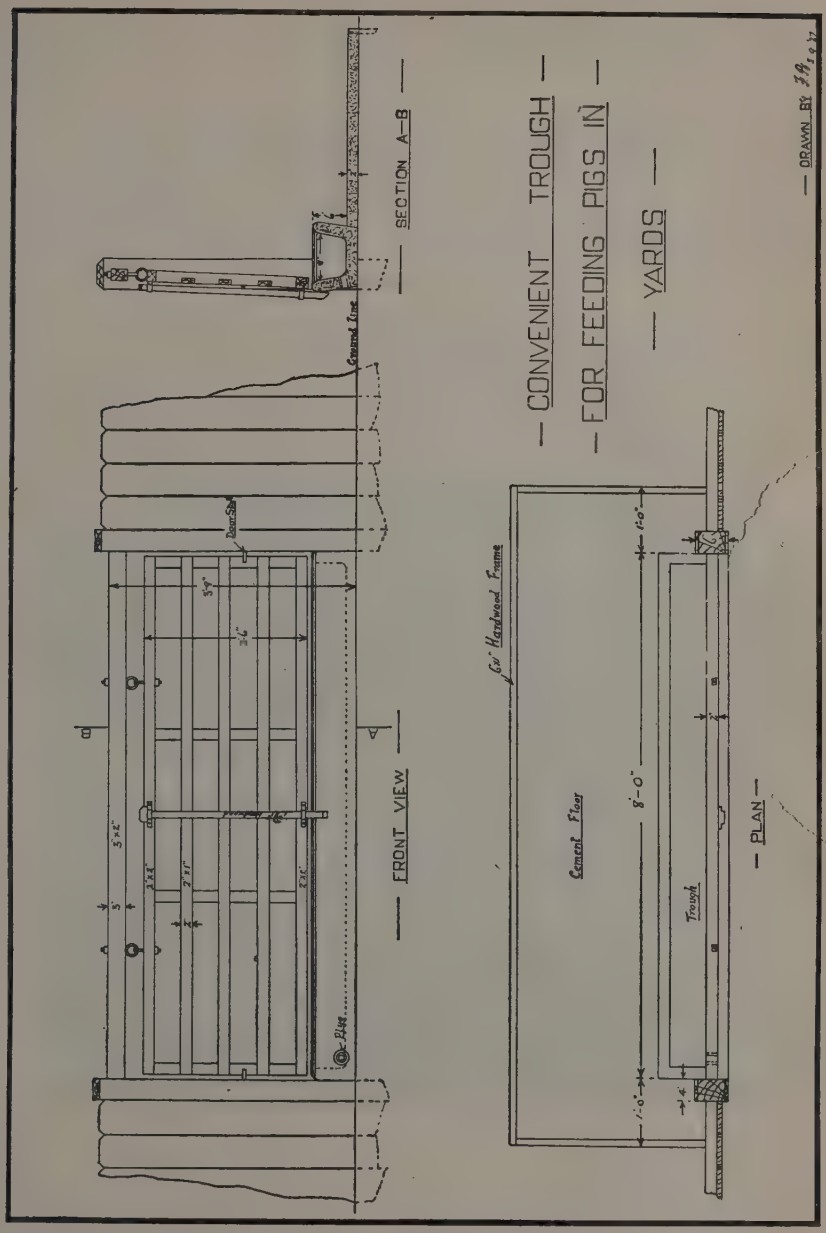


Plate 90.

The trough illustrated in Plate 88 is 14 feet in length, and the width is 15 inches overall, having its sides of 2½-inch thickness, reinforced with barbed wire, lengthways. The trough is 5 inches deep and the inside width is 10 inches. The platform is 7 feet wide and 16 feet long

and 4 inches in thickness, and is surrounded by a protective flange 4 by 2 inch hardwood, bolted together at the corners to protect the edges of the platform from being broken away.

Improvements could be made to such a trough by having a bung in the end leading outside the pen to facilitate cleaning the trough. Also, if the end of the trough projected outside the fence, food could be poured in from the outside. Iron bars of ½-inch thickness set into the concrete across the trough 10 inches apart prevent the pigs from fighting at the trough, and also prevent pigs from rooting food out of the trough. In such a trough it is preferable to have all the corners rounded off in order to facilitate cleaning.

PLATE 91.
Automatic water fountain suitable for pigs in paddocks.

The V-shaped wooden trough, as illustrated in Plate 89, is very useful as a movable trough. This type of trough can be made of varying sizes to suit requirements. The timber must be sawn and tightly fitted to prevent leakages. A dressing of tar inside and out acts as a preservative of the wood, and also makes it watertight and more hygienic. Such a trough, built on a movable wooden platform, is most convenient for paddock use.

Cast and galvanised iron troughs of various designs are procurable from hardware stores, and these are satisfactory under certain conditions.

Automatic Waterer.

Plate 91 illustrates a watering device used at the Kairi State Farm piggery. A 40-gallon drum is set into a trough 6 inches deep and the whole is fixed on to a slide. The drum has a $\frac{1}{2}$-inch plug hole $1\frac{1}{2}$ inches from its bottom, and a larger plug hole for filling at its top. The lower hole allows the water to flow out to a sufficient height for the pigs to drink from the trough, and to fill the drum, the bottom hole is plugged and the top hole opened.

Self-feeders.

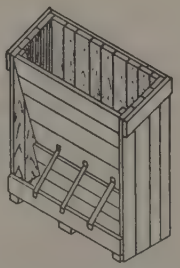
Self-feeding of pigs is as yet little practised in Australia, mainly because pigs are kept chiefly to utilise by-products, such as separated milk, which are not readily adaptable to self-feeding; but when the price ratio of grain and pork is such as to make the pig a profitable means of disposing of grain, pig raising must be considered from a somewhat different viewpoint.

Plate 92.

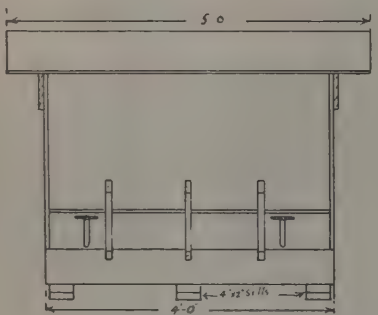
Baconers grown on the self-feeder in which was placed a mixture containing 80 lb. maize meal, 10 lb. lucerne chaff, and 10 lb. meatmeal. The pigs were also given unlimited supplies of water to drink.

The grain grower who keeps pigs, but has no milk foods, can make good use of his grain by feeding it in combination with such feeds as lucerne chaff and meatmeal, both of which are substitutes for separated milk in the pig's ration. Such feeds as these are adaptable to dry feeding through a self-feeder whereby the pigs have several days' food supply placed in the feeder and they are allowed to help themselves.

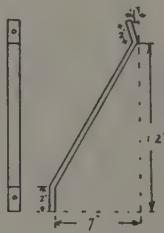
ONE WAY SELF FEEDER FOR PIGS



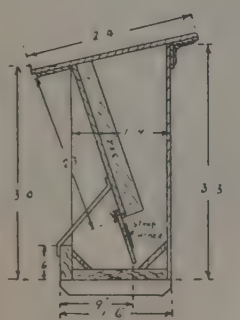
Perspective with Roof Removed



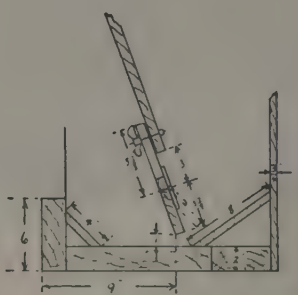
Front Elevation



Detail of Iron Strap



Section



Detail of Slide and Hinged Flap

Drawn by J.A.

PLATE 93.

Under certain conditions self-feeding has many advantages and is worthy of further trial.

Plates 92 and 93 illustrate a type of self-feeder which has given satisfactory results in practice.

Plate 94.
A useful portable loading race.

ONE-WAY SELF-FEEDERS FOR PIGS—MATERIAL REQUIRED.

Members.	Number.	Length.	Size.	Material.
		Ft. In.		
Skids	Three ..	1 6	4 in. x 2 in.	Hardwood
Trough	One ..	4 0	6 in. x 2 in.	Pine
Trough	One ..	3 10½	12 in. x 2 in.	Pine
Trough	One ..	3 10½	4 in. x 2 in.	Pine
Trough	One ..	3 10½	8 in. x ¾ in.	Pine
Trough	One ..	3 10½	4 in. x ⅜ in.	Pine
Front panels	Five ..	3 10½	6 in. x ⅜ in. T. & G.	Pine
Front panels	Two ..	2 3	3 in. x 2 in.	Pine
Sliding and hinged flaps	Two ..	3 10½	4 in. x ¾ in.	Pine
Ends and back	Twenty-four	3 3	6 in. x ¾ in. T. & G.	Pine
Ends and back	One ..	7 0	6 in. x ¾ in.	Pine
Top	Ten ..	2 4	6 in. x ¾ in. T. & G.	Pine
Top	Two ..	5 0	6 in. x ⅞ in.	Pine

Hardware—Three 1-inch by ¼-inch iron straps.
Six 3-inch strap hinges.
Two 3-inch by ½-inch bolts with thumb nuts
Nails, &c.

PLATE 95.
This junior farmer club member provides his pig with an oiling post.

PLATE 96.
A wooden crate suitable for weighing pigs. Note the strong construction, "slide-up" doors at both ends, and wires coming from bottom of crate to be attached to hook of the spring balance. Softwood should be used in the construction of the crate so that its weight will not be too great.

Shade.

(*See* Plate 85.)

Pigs should be provided with ample cool shade in hot summer months, and this can be done either by planting shrubs or hedges, or by building a framework of 3-inch by 2-inch hardwood and covering the top with bushes or thatching it with grass. Where a clump of natural scrub can be left in the pig paddock, good shade is provided where the pigs can burrow away into the cool and find comfort during the hottest part of the day.

Plate 97.

Crate in position, ready for use with front door closed. Note the arrangement of the top beam, lever, and spring balance.

Oiling Post.

An occasional application of oil to the pig's skin keeps it in soft and healthy condition, and at the same time the oil destroys lice and other external parasites on the pig. A convenient self-oiler can be made by wrapping a bag or a rope round a post or a tree in the run from the ground level up to a height of 2 feet. The bagging or rope is kept saturated with oil, and the pigs oil themselves by rubbing against the post. Crude petroleum oil or used sump oil is useful for oiling pigs.

Weighing Pigs.

As both pork and bacon pigs are usually sold on a basis of weight and quality, and as the ruling price per lb. varies according to specified weight limits, it is important to the pig raiser that he should have a fairly accurate knowledge of the weight of his animals before they are offered for sale.

On account of pig trucking days being two or more weeks apart in some districts, farmers are sometimes forced to market their pigs either too early or too late to have them at the most profitable marketing weights, but in many cases a farmer is able to market his pigs to much better advantage when he is able to weigh them on the farm at regular and frequent intervals prior to trucking.

Even after years of practice, guessing the weight of pigs is not so reliable as weighing them, and where regular consignments of pigs are sent from a farm the use of weighing scales can be recommended, for, with intelligent use, they soon more than defray their cost in the saving of cash effected by marketing pigs at the most profitable weights.

The crate should be light, yet strong; a convenient size for a crate to hold one bacon pig is 3 feet 6 inches long, 2 feet 6 inches high, and 1 foot 6 inches wide (inside measurements).

If the weighing crate is arranged in a race, the pigs can be brought from their yard, weighed, and then returned to the yard conveniently.

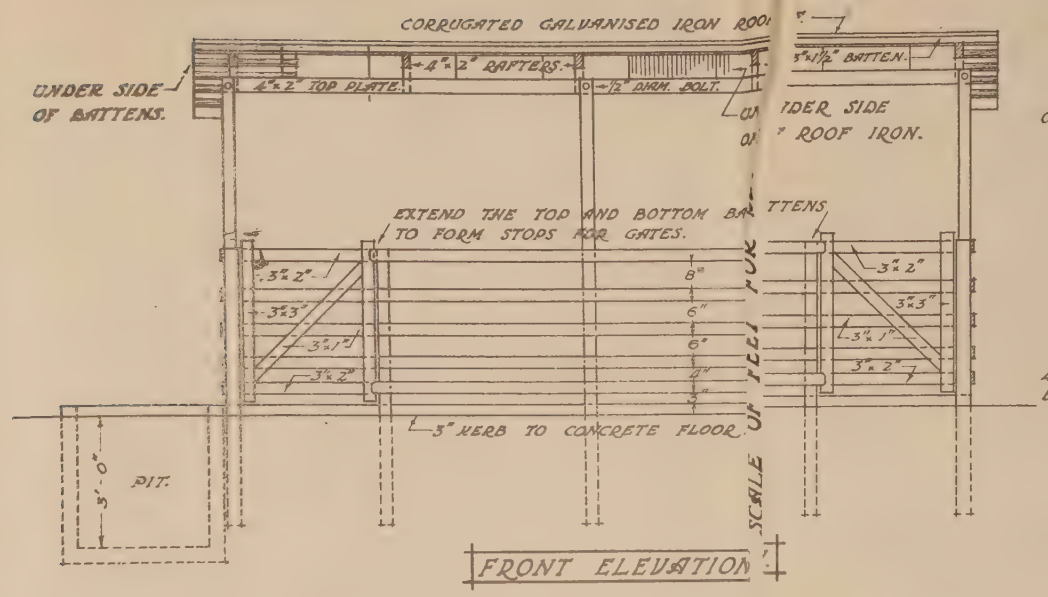
There are many good methods of weighing pigs on the farm, and the most suitable method must be determined according to circumstances, but the suggestions given herein will be helpful to a large number of pig raisers. Special platform scales with a pig crate built on can be purchased at prices around £50, but at such a price their use must be limited to very large piggeries and trucking yards where large numbers of pigs are weighed.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

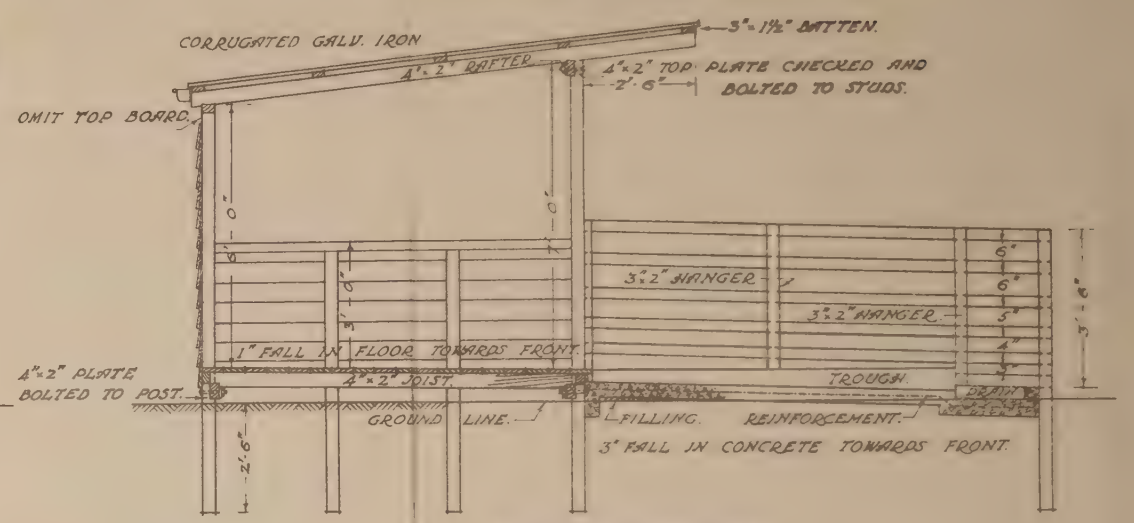
DEPARTMENT OF AGRICULTURE AND STOCK.

QUEENSLAND.

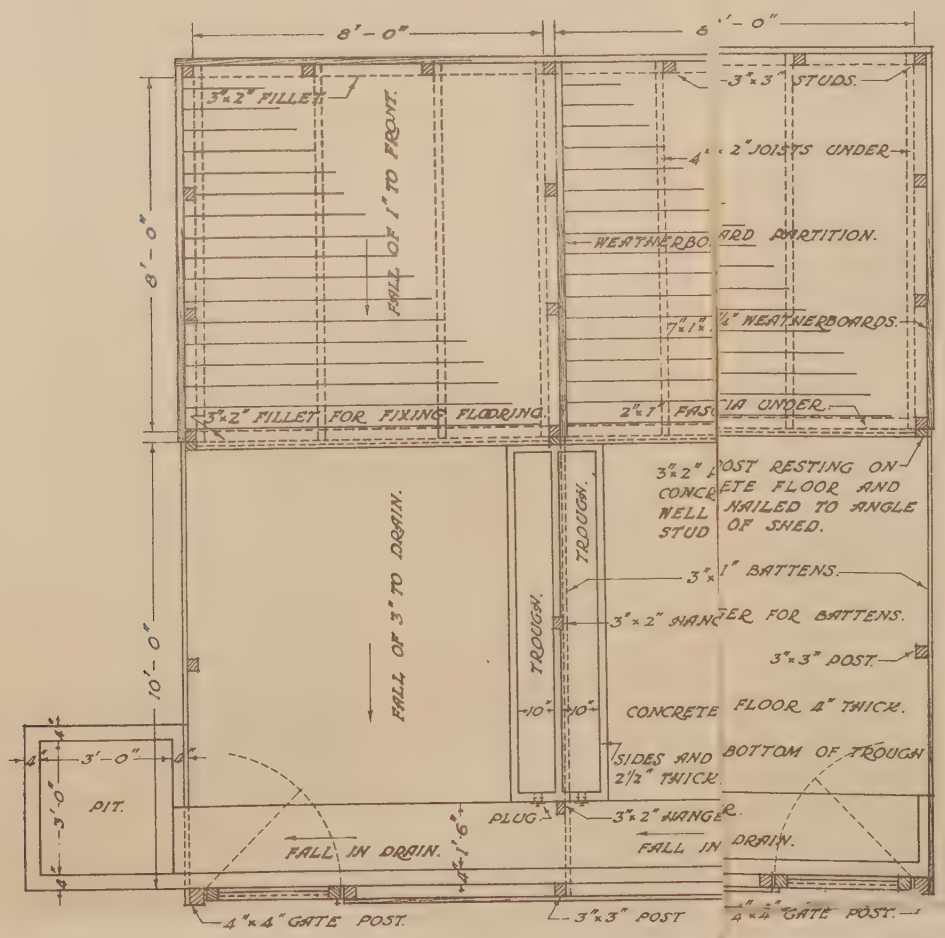
PIG PENS FOR INTENSIVE HOUSING.



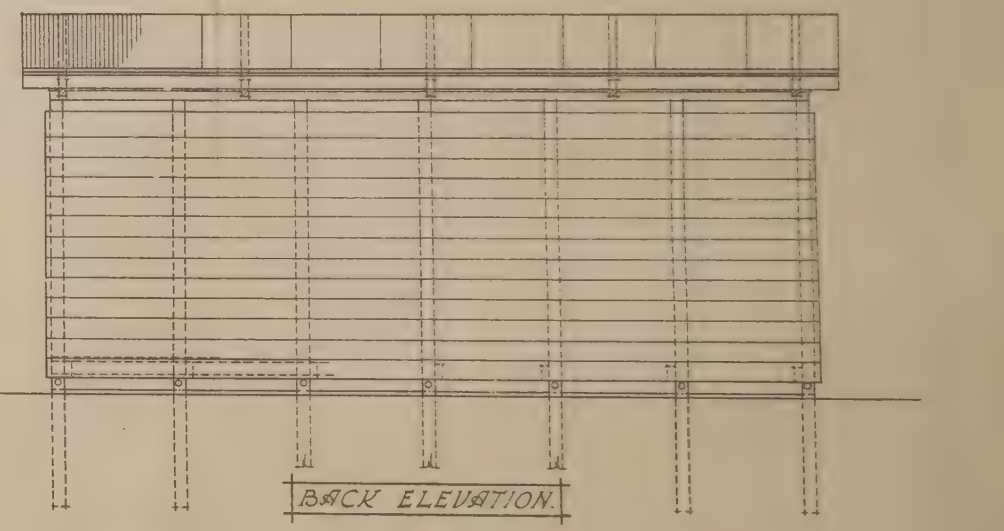
FRONT ELEVATION.



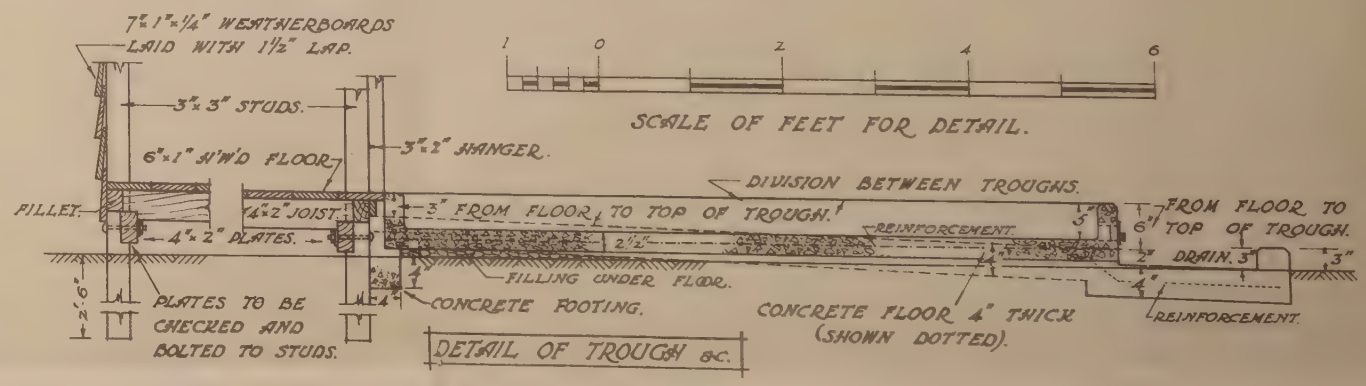
CROSS SECTION.



PLAN.

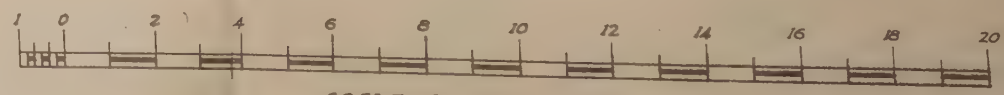


BACK ELEVATION.



DETAIL OF TROUGH &C.

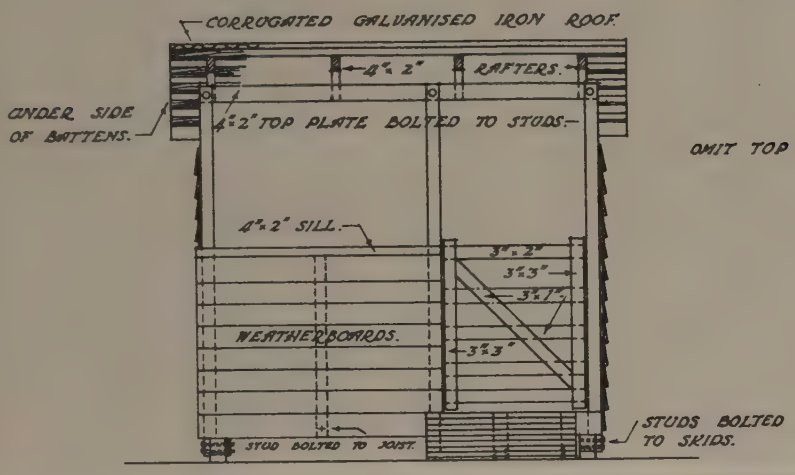
SCALE OF FEET FOR DETAIL.



SCALE OF FEET FOR PENS.

DEPARTMENT OF AGRICULTURE AND STOCK.
QUEENSLAND.

PORTABLE PIG SHED.



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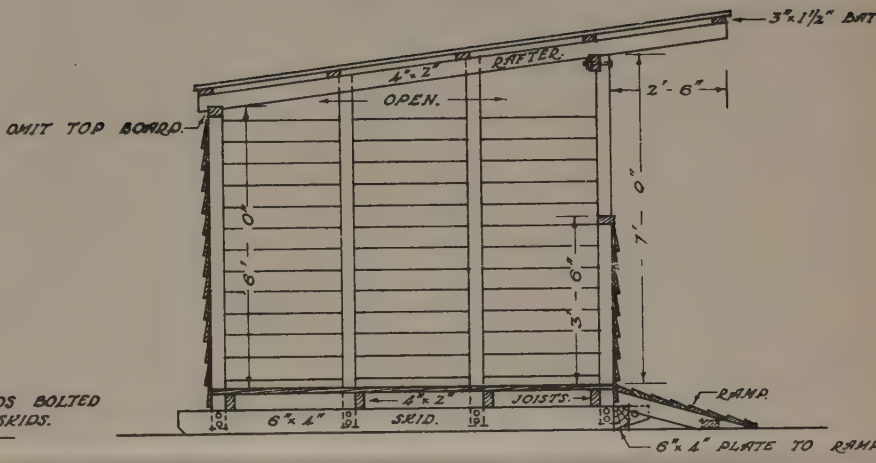

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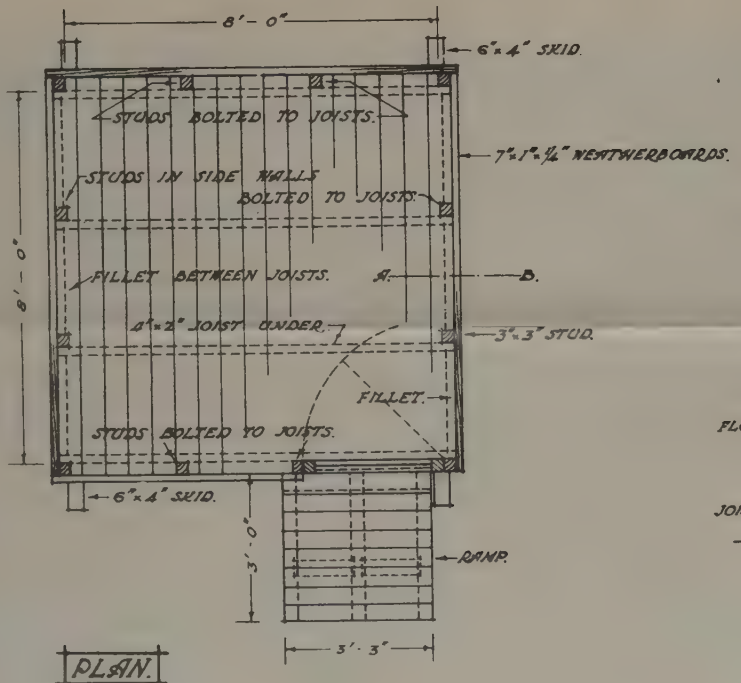

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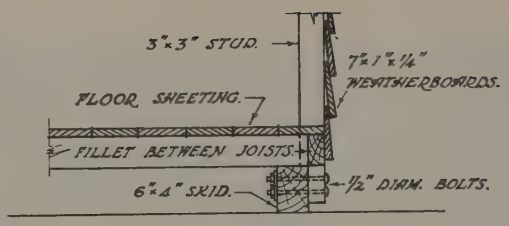

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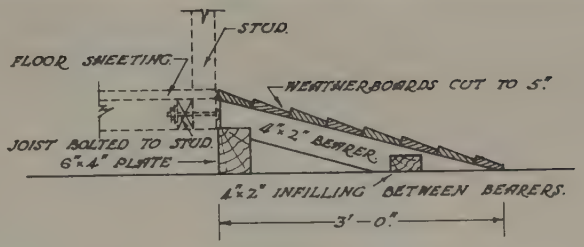

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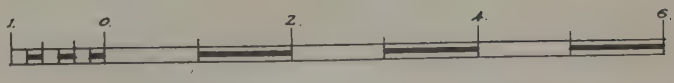
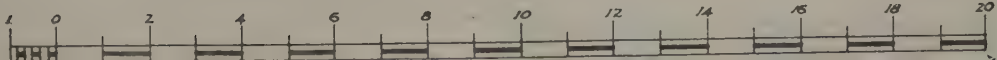


SCALE OF FEET FOR DETAILS.



The Feeding of Poultry.

By P. RUMBALL and J. J. McLACHLAN, Poultry Staff,
Department of Agriculture.

THERE is probably no matter of greater importance to the successful poultry raiser than that of feeding. For this reason and to assist in the economical utilisation of the various foods available, poultry raisers should have a thorough knowledge of the principles underlying feeding. Although it is possible for many to buy mixed foods suitable for either egg production or the growth of young stock, it is not always advisable for the commercial poultry raiser to rely solely on these foods, for the distance from the manufacturer adds considerably to their cost; besides it may also be possible for the poultry keeper to make use of foods obtainable in different localities at lower values.

Poultry, as with all livestock, require food first for the maintenance of the bodily functions—that is, the supplying of heat and energy and repair of waste tissue, the surplus only being used for body development, or, in the case of moulting stock, the growth of feather, and in laying stock the production of eggs. It is possible, and it frequently happens, to retard the development of growing stock by incorrect feeding, and in adult stock to just maintain the birds in perfect health without procuring the desired production of eggs. It is, therefore, essential for the poultry raiser to realise at the outset that under-feeding is not conducive to satisfactory results, also that the production of eggs or the bodily growth of young stock can only be obtained by feeding quantities in excess of the bodily requirements of the bird.

To attain success in poultry feeding, a practical knowledge of food values, the classification of ingredients, uses of these ingredients, and the composition of various poultry foods is necessary.

Classification of Food Ingredients.

The food ingredients are generally classified in the following groups:—Proteins, carbohydrates, fats and oils, fibre, ash, and moisture.

In addition to this classification, most careful consideration has to be given to substances known as vitamins, for it has been proved by experiment that it is impossible to obtain correct development in growing stock, or satisfactory egg production from laying hens, with a properly balanced ration of protein and carbohydrates if certain vitamins are absent. Further, the absence of essential vitamins is responsible for diseases of a malnutritional nature and the reduction of natural resistance against diseases.

Protein.

Protein is a compound built up of nitrogen, hydrogen, oxygen, and a few minor constituents. During the process of digestion the insoluble proteins are converted into soluble amino-acids which are absorbed by the walls of the intestines, passing into the circulating blood, by which means they are transported to the various parts of the body to fulfil their functions. There are about twenty known amino-acids, many of which are essential to the well-being of the fowl. All forms of these acids are not found in any one class of food, consequently it is necessary to have variety in the ration in order to avoid the absence of any essential amino-acid.

As there is approximately 20 per cent. of protein in the body of the fowl (live weight), the importance of feeding an ample supply of protein can be understood, but it is not wise, in fact harmful, to feed protein-rich foods to excess. In the first place, protein-rich foods are generally the most expensive of the food material available, and for this reason an excess is uneconomic. Secondly, protein cannot be stored in the body for future requirements. The surplus after being converted into amino-acids is divested of its nitrogen by the liver and converted into fat, and is stored as such, and the separated nitrogen voided as uric acid through the kidneys. Therefore, as well as an excess being uneconomic, it places an undue strain upon two vital organs—namely, the liver and kidneys.

Carbohydrates.

Carbohydrates are compounds of carbon, hydrogen, and oxygen. Substances such as sugars and starches are carbohydrates. During digestion these substances are broken down into simple sugars and absorbed. After absorption these sugars combine with the oxygen of the blood and are converted into carbon dioxide and water. The process of oxidisation yields the heat and energy required for the functions of the body. Excess of carbohydrates are stored as fats within the bird.

Fats.

Fats are compounds of carbon, hydrogen, and oxygen. The oxygen content is about 11 per cent., whereas that of carbohydrates varies from 49 to 53 per cent. Fats and oils are used by the bird to supply heat and energy, the surplus being stored as fat. Owing to the greater quantity of oxygen necessary to oxidise fats and oils, due to its lower oxygen content, a given quantity of such substance will create more energy than a similar quantity of carbohydrates.

Fats to be absorbed by the system must first be converted into fatty acids and glycerine. They are not so easily digested as carbohydrates, and should not be fed to excess. As a heat and energy producer fats are worth from 1·9 to 2·5 times as much as carbohydrates.

Mineral Matter.

Mineral matter is that portion of plant or animal life that is left after burning. It is used in building up the frame, and in the fluids of the body to control digestion and absorption. It has been established by practice that all the minerals required by poultry are not present in the usual food supplied on commercial farms, also that the mineral requirement of the fowl varies with age. Only a sufficient quantity of mineral matter is absorbed by the fowl for immediate requirements, consequently a continuous supply must be fed.

Fibre.

Fibre includes the least digestible of foods, such as the outer cells of grains and fibrous matter in plants. Excessive quantity of fibre are to be avoided, as they are not only indigestible by poultry but, when excessively fed, especially in young stock, irritate the intestines.

Vitamins.

Vitamins are now known to be chemical substances, and may be classed as accessory food supplies. No matter how well a ration may

be balanced, without these substances satisfactory results cannot be obtained. There are five vitamins, commonly known as A, B, C, D, and E.

Vitamin A may be referred to as a growth-promoting factor. It is built up by plants, and is found in green feeds, lucerne chaff and meal (commonly used as a green-feed substitute), bran, yellow maize, and whole wheat, and is rich in cod liver oil. The absence of this vitamin in a ration fed to adult stock will cause nutritional roup and render the birds more susceptible to coccidiosis, fowl pox, severe colds, tapeworm infection, &c. Its presence in sufficient quantity will increase production, hatchability, and better development in growing stock.

It has been estimated by one authority that it is necessary to feed with bran and pollard 5 per cent. dry lucerne and 30 per cent. yellow maize meal with grain feeding in the evening of equal parts yellow maize and wheat to supply all the vitamin A necessary to good production.

The most economic form of supply of this vitamin is green feed and yellow maize, while the most convenient, in the absence of either of these foods, is 1 per cent. of a good grade of cod liver oil.

Vitamin B.—This vitamin is common to most of the foods fed to poultry, and no trouble has been recorded due to its shortage.

Vitamin C.—It was at one time thought that poultry were not susceptible to scurvy, but a recent report of an American authority indicated that growing chickens were subject to the disorder, but only after feeding a ration that would not be used commercially. This vitamin does not appear to be of importance in poultry feeding.

Vitamin D.—This vitamin, with vitamin A, is most important in the feeding of poultry. It is essential for the assimilation of the calcium and phosphorus, and naturally most important to the growing birds. This vitamin is present in abundance in cod liver oil, but its cheapest form is sunlight. Sunlight enables it to be developed in the body of the bird. With modern conditions of rearing it happens that chickens, and at times adult birds, do not get all the sunlight they should. In such cases cod liver oil can be used as a substitute. Prolonged overfeeding of vitamin D produces loss of appetite, followed by loss of weight, general ill-health, and ultimately death.

Vitamin E.—This vitamin is associated with reproduction. Investigations have shown that the feeding of rats with a ration in which this vitamin was absent brought on sterility. Sterility was cured by the feeding of small quantities of wheat germ oil. In practice breeders would guard against the possible cause of infertility by feeding good sound wheat or wheat germ oil and green food in the ration of their breeding stock.

Digestibility of Foods.

The chemical composition of a food does not indicate its digestibility, and as regards poultry little is known on the subject. It is a question that can only be definitely ascertained by feeding experiments conducted with poultry.

Palatability of Food.

Results are not obtained by making up a ration with definite proportions of the constituents referred to later unless the fowls will eat

it. If they become hungry enough they will consume a sufficient quantity of almost any food, but it will be at the cost of a very much reduced egg yield. Upon analysis, barley is found to be a food carrying almost the right quantities of protein and carbohydrate essential for egg production, but when put into practice we find that fowls do not relish the grain, and they have to be gradually accustomed to consume it. It may be as well here to mention that in making any change in the ration to laying stock, do so gradually, as sudden changes in the diet cause a reduced egg yield and frequently a false moult.

Methods of Feeding.

Several methods of feeding are commonly practised, and in many instances with equal degree of success. Each method has its own advantage and appeals to the individual feeder.

The methods are known as—(1) wet mash and grain, (2) dry mash and grain, (3) all-mash, and (4) pellets.

Wet Mash and Grain.

The mash is a mixture of different ingredients, moistened to the extent that when a handful is squeezed it will remain in mass form, and when dropped a few inches will break up into small particles. It would be more in keeping with this class of mash if it were termed "moist" instead of "wet."

With this type of feeding the mash has to be prepared daily and distributed to the birds, care being taken to feed sufficient for their requirements and not allowing any to remain unconsumed—say, after an interval of half-an-hour after feeding. The mash should be placed in shallow narrow tins or troughs, and as the food should be consumed within about half-an-hour there should be no lack of feeding space or the more timid class of bird will not procure all that she requires for maximum production.

It is usual to feed wet mash first thing in the morning and grain at night. Many breeders reverse this order with successful results, and find that it fits in better with the daily routine.

Dry Mash and Grain.

A mash similar to that used for a wet mash is prepared and placed in hoppers. Birds are at liberty to consume the food at will, and although certain feeding space has been found necessary for best results the more timid fowl has a better chance of securing its requirements from a limited space than is the case in wet mash feeding. One foot of hopper space should, however, be allowed for each ten birds. The advantage of the system of feeding is that instead of mixing and feeding mash daily a quantity can be prepared and distributed once per week, and so reduce the labour of feeding. The most serious disadvantage, however, that the writer sees in this method is that the constant supply of feed encourages rats to harbour in the poultry pens.

With this system of feeding grain is usually fed during the evening, allowing birds ample time to scratch and find grain distributed.

All Mash.

As the name suggests, nothing but mash is fed. A suitable mixture is made and placed in hoppers. The birds have access to this food at

all times throughout the day. This system of feeding possesses advantages over both the other systems previously mentioned, although it has the disadvantage of encouraging rats. With the all-mash system, quantites of food can be placed out once per week, thereby saving the daily attention of feeding. The birds are also compelled to consume a ration suitably balanced, and from practical experience this system suggests the possibility of preventing breeds of the heavy variety putting on excessive internal fat. Production with this system of feeding is equal to any other. Fowls do not take kindly to radical changes in grain feeding, but with the all-mash system the meal of various grains may be substituted without any appreciable easing in production. Naturally, the converting of grain into meals increases the cost of feeding slightly, but the saving in labour and the assurance that the birds are being fed a ration suited to their requirements appear to justify the slight increase in cost.

Pellet Feeding.

Pellet feeding is nothing more or less than the feeding of an all-mash in the form of pellets. The feeding of the food in this manner enables the bird to obtain a sufficient quantity of food in much less time than when the food is in the form of a mash, but when sufficient hopper space is allowed and the birds have been reared upon all-mash they appear to have no difficulty in consuming all they require. The feeding of pellets is more costly than any other system, due to the fact that they have to be manufactured.

The Feeding of Chickens.

In the feeding of chickens it is most important to bear in mind that nature has provided for the first day or so of the chicken's life, as just prior to hatching the balance of the egg yolk is drawn into the abdomen of the chick. Most breeders allow at least forty-eight hours to elapse before feeding. Chickens fed earlier are subject to bowel trouble. A system of prolonged starving, however, should not be practised, as it has a weakening effect, from which many chickens do not recover.

Requirements for Growth.

Chickens make very rapid growth the early part of their life. This development is most rapid during the first six to eight weeks, consequently rations having a relatively high protein content are necessary to give the best development. From experimentation it has been fairly definitely established that rations having a crude protein content of 20 per cent. should be used during the first six to eight weeks, and after that period reduced to 15 per cent. The protein requirement of a chicken does not alter as sharply as is suggested, but these periods and protein content are suggested as meeting the practical requirements of the poultry raiser.

It is a common practice among many poultrymen to cut down the protein content after the chickens are about sixteen weeks of age, in order to delay sexual development. This, we think, is desirable if the birds are maturing too rapidly, but development can be controlled to only a very limited degree. Excessive protein feeding must be guarded against, as constant and overfeeding of protein-rich foods causes deposits of urates in the ureter, kidneys, and other organs, as well as placing an undue strain upon the liver.

It is generally conceded that milk is the most desirable protein feed for chickens and growing stock, but owing to its cost its exclusive use is not possible. Wherever possible milk should form a portion of the ration. It may be given in the form of curds, semi-solid milk, butter milk, or butter milk powder. As a drink milk is excellent, but it is objectionable owing to the difficulty of keeping chickens clean. The writer favours butter milk powder, owing to the ease with which the powder may be incorporated in the mash, thereby controlling the kind of food that each chicken consumes. It has, however, no definite advantage from a feeding value point of view apart from its concentration. Proteins build up the flesh, but at the same time a bony framework is necessary. Analysis of the chicken at different ages, according to Halman, indicates that it was particularly important to allow for the mineral requirement from the eleventh to the twenty-fourth week. In all experiments conducted by the Department, the increased mineral intake has been allowed for by the addition of bonemeal to the mash at eight weeks of age, and by allowing the birds free access to grit (shell and hard).

Food Consumption of Chickens.

One is often asked how much food should be given to chickens. Probably no better reply can be given than the publishing of a table from actual experiments conducted in this State.

FOOD CONSUMPTION AND WEIGHT OF CHICKENS.

Age.	Leghorns.		Australorp.	
	Weight of Chickens.	Food Consumed.	Weight of Chickens.	Food Consumed.
	ozs.	ozs.	ozs.	ozs.
Day old	1·3	..	1·36	..
1 week	1·97	1·64	2·14	1·53
2 weeks	3·31	3·36	3·61	3·32
3 weeks	5·31	4·80	5·84	5·05
4 weeks	7·61	6·46	8·68	7·20
5 weeks	9·94	7·58	12·08	6·89
6 weeks	12·92	8·96	15·86	10·62
7 weeks	16·65	8·65	20·17	13·95
8 weeks	20·41	13·29	25·31	15·05

The variation in weight from week to week and the ever-increasing amount of food required suggests the undesirability of indicating what should be supplied.

The food requirements increase week by week, and a system of feeding where the growing birds may consume all they require is the most desirable.

The all-mash method of feeding chickens by reason of the fact that the kind of food consumed is easily controlled, and that it is always in front of the birds, is suggested as being the most desirable. All-mash should be placed in shallow trays about 1 inch in depth during the first few days. The trays are then increased to a depth of 2 inches, and by the end of the first week troughs about 4 inches wide may be used. At this age chickens will commence to scratch, scattering the feed from the trough. This can be prevented by placing a piece of

netting on top of the mash loose enough to sink as consumption takes place. During the first week 8 feet of feeding space should be allowed for every 100 chickens, and later increased to 12 feet. Prior to the mash being covered with netting it is important that only a little food at frequent intervals should be placed in the trays in order to avoid wastage.

In fact, the frequent feeding of all-mash appears to induce a greater food consumption, with the result of better development.

Breeders who do not desire to feed an all-mash could make use of commercial chick grains and growing mashes. These could be fed as directed by the manufacturers. It has been the general custom for many poultry raisers to use scratch grain only for a short period of a chicken's life, but in the view of the more satisfactory results obtained by feeding a ration of a relatively higher protein content than chick mixtures usually have, early mash feeding appears essential.

Chickens may be reared satisfactorily upon moistened mashes and grain from about two weeks of age, but the mashes must be fed at frequent intervals. This system offers the advantage of utilising milk as a medium of moistening the mash when such is available. The feeding of dry mash, however, is suggested as a safer method of feeding, as the possibility of food becoming sour, with the probable consequence of bowel trouble among chickens, is avoided.

Suitable All-mash Mixture.

The following mashes have been used successfully in experiments conducted by the Department, and are suggested as a basis upon which to work. At times it may not be commercially sound to stick hard and fast to the ingredients suggested, but from the table of analysis supplied it will be possible for the breeder to compound other suitable mixtures.

Ration.	1–8 Weeks.	8 Weeks to Maturity.
Maize meal	40	56
Bran	20	10
Pollard	20	10
Meat and Bone meal	7½	5
Dried buttermilk	10½	5
Salt	1	1
Cod Liver Oil	1	1
Peanut meal	..	10
Bone meal	..	2
Crude protein content	17·15	18·07

The ration in this test from eight weeks to maturity carried a greater protein content than subsequent tests have proved essential, likewise better results have been obtained with rations of higher protein content during the first period. The suggestion is made that 20 per cent. should be the standard for the first eight weeks, and then reduced to 15 per cent.

Requirements for Egg Production.

The laying fowl has first to provide from her food supply for—

(1) Maintenance of vital functions;

(2) Growth requirements; and

(3) The production of eggs.

PLATE 98.
Automatic feeding hoppers in use on a poultry farm near Brisbane.

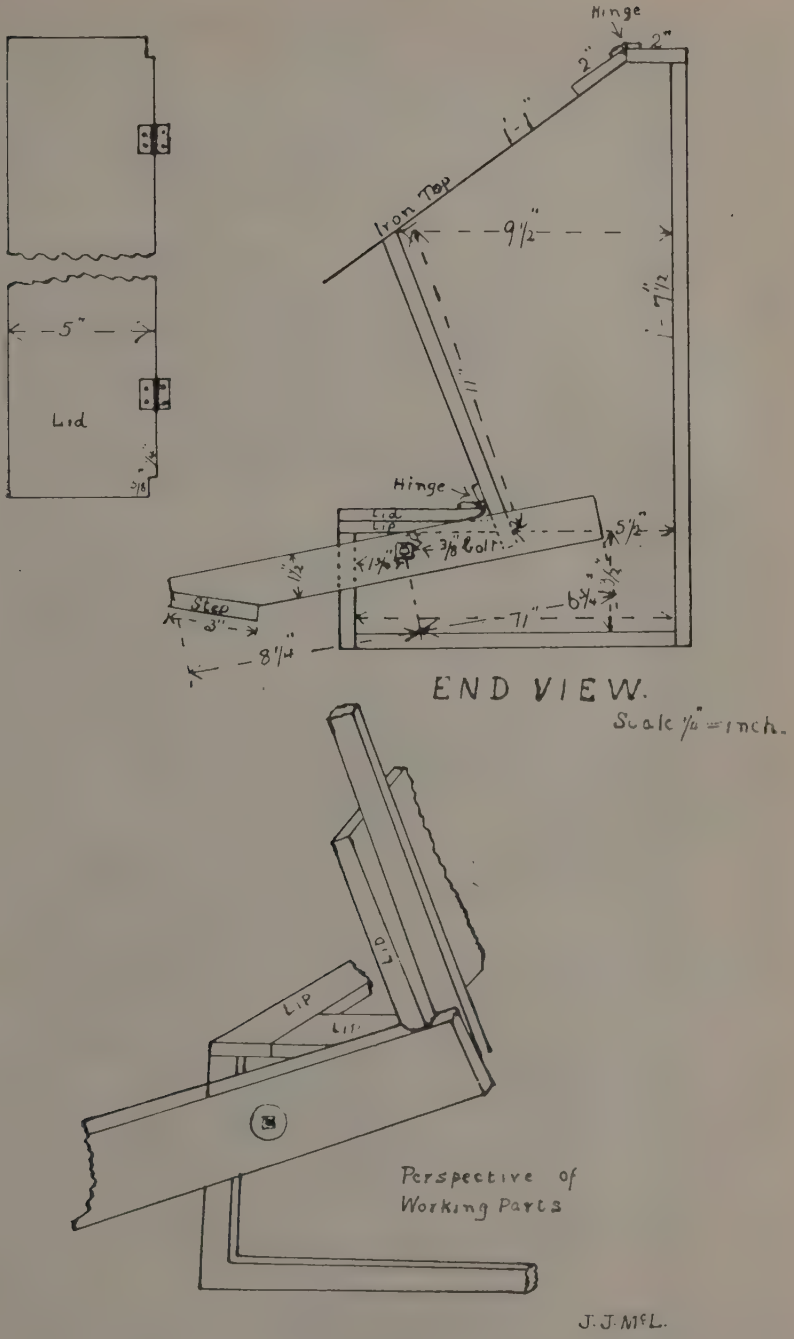


PLATE 99.
Plan of automatic feeding hoppers as illustrated.

The first call upon the food supply is for that of vital functions, then growth, and any surplus nutrients used in the manufacture of eggs. It will therefore be seen that the greater the production the greater will the consumption be, and that egg production is only possible by feeding quantities of food in excess of body requirements. It is generally estimated that a hen in full lay will consume approximately 2 ounces each of grain and mash per day. This quantity, however, will be in excess at times, and again be deficient during the period of peak production.

The majority of cereal foods available are generally deficient in protein, and in preparing a ration it is necessary to use protein-rich foods in the form of milk, milk powders, and meat meal. Protein-rich vegetable foods are available, but it has been found from experience that animal proteins give better results than vegetable. This probably is due to their greater palatability and to the fact that the range of amino-acids is wider. From practice it has been found that rations having a total protein content of 15 per cent. give satisfactory results. As protein-rich foods are the most costly, it will readily be understood that the object of the feeder should be to use the minimum quantity necessary for maximum production.

The poultry raiser who does not desire to prepare his own ration may purchase laying mashes to be fed in conjunction with grain, also all-mash. These laying mashes have approximately 18 to 20 per cent. of crude protein, and when fed in conjunction with grain, say equal parts of maize and wheat, the total crude protein content of the ration is reduced to the vicinity of 15·5 per cent.

In addition to the protein and carbohydrate, the mineral content of the layers' ration has to be taken into consideration. The average amount of carbonate of the egg shell is one-fifth of an ounce. To supply the requirements, say, in the mash, 4 per cent. of calcium carbonate would be necessary, but as hens not laying would only void the material it is a better practice to have shell-forming material in the nature of limestone and shell grit always before the bird in separate receptacles.

Commercially, yolk colour does not appear to have as yet caused us any concern, but the consuming public do not like an excessively pale-yolked egg, and to overcome this green feed and yellow maize should form a definite part of a laying ration. Both foods are rich in vitamins, and green feed materially assists in supplying the mineral requirements of poultry. In the absence of green feed lucerne chaff or meal should be used.

The manner in which layers may be fed varies. All systems previously referred to have been proved successful. The most popular at the present time is the feeding of dry mash and grain, although all-mash is coming more into vogue. For those who desire to prepare their own mixture the following rations are suggested as a working basis:—

Ration—Grain and Mash.

Mash.	Per cent.	Grain.	Per cent.
Lucerne chaff or meal	10	Wheat	50
Bran	28	Maize	50
Pollard	30		
Maize meal	20		
Linseed	2		
Meat meal	10		

Supplements to each 100 of mash—

½ lb. Salt.
2 lb. Bone Meal.
1 per cent. Cod Liver Oil.

All Mash.

	Per cent.
Meat Meal	5
Lucerne Chaff	6
Linseed	1
Maize Meal	30
Bran	20
Pollard	40

Supplements—

Bone meal	2 lb.	To every 100 lb. of Mash.
Salt	½ lb.	
Cod Liver Oil	1 lb.	

Care of Moulting Hen.

It is a common practice among breeders to give little attention to moulting birds. In many instances they receive nothing but a grain ration. Feathers contain a considerable amount of protein, and the most economical manner of getting birds back into production is to feed protein-rich foods as provided in a laying ration. Moulting may be induced by the feeding of nothing but grain at or about the time birds usually moult. When once the moult has commenced laying rations should be supplied, as it will take about a fortnight for the manufacture of the first egg after the moult is completed.

Fattening.

Two classes of birds have to be considered—old hens and cockerels. The ability of the feeder to do much with old hens in good condition is questionable, but those slightly out of condition could be improved with ten to fourteen days' crate feeding. From experiments that have been conducted it has been found just as economical to rear cockerels to the various marketing stages on the growing rations used for pullets. Ten to fourteen days crate feeding of these birds would undoubtedly add to their market value. As the old hens or young cockerels are to be handled they should be freed of external and internal parasites before being submitted to a fattening process. The crates could be small coops 2 feet wide, 3 feet deep, and 3 feet high. These crates would hold about six birds for the period, and if the floor is wire netting and off the ground, the evacuation would fall through and the birds be kept clean. The front should be of wire or slats wide enough apart for the birds to get their heads through to enable feeding from a trough in the front. An all-mash mixture of a relatively high protein content fed as a gruel three times a day will undoubtedly improve condition. With this system of feeding water is not necessary. Any food left over, say, after half-an-hour should be removed in order to keep the appetite keen. A mash of equal parts maize meal and pollard, plus 10 per cent. butter milk powder and 5 per cent. meat meal, is suggested.

Preparation of Mashes.

On the majority of farms the various ingredients that go in the making of mash are either mixed with a shovel upon the floor of the feed room or in some trough.

If the mash is to be fed wet it is a good idea to soak the lucerne chaff or meal in water over night. Just sufficient water should be used to make the mash of the correct consistency and the salt used in the mixture dissolve in the water first. This ensures an equal distribution.

In making a dry mixture the salt should be added to the protein-rich foods in order to increase the bulk through which the salt is distributed. This action ensures an even distribution of salt throughout the mash.

PLATE 100.
A handy mash mixer.

When using cod liver oil, to ensure an equal distribution it will be found most convenient to incorporate it in the bran in the first instance.

Much labour will be saved and better mixing of the various ingredients ensured by using a mash mixer. An appliance that serves the purpose is easily constructed by the poultry raiser. The mixer consists of a drum constructed of 22-gauge galvanised sheet iron with tongued and grooved pine ends, as illustrated. A pipe of 1¼-inch diameter is passed through the centre of the drum, fitting into hardwood bearings at each end. This pipe can be keyed to the drum by boring a hole through the pipe close to the drum and using a piece of No. 8 wire as a key. Naturally, the No. 8 wire has to be bolted to the drum.

The mash is mixed by a tumbling process, and to assist in raising the mash on the side of the drum while it is revolving four battens should be attached lengthwise inside the drum 2 inches from the iron. The battens should be of 2½ by 1-inch timber. They are necessary for the thorough mixing of dry mash.

The diameter of the drum is 3 feet 6 inches, and the length equal to the width of the iron. The sheet iron to pass around the drum will

have to be riveted end to end, and the sides attached to the pine ends every 2 inches with screws. A convenient size opening, the full length of the drum, must be left for filling. A sliding close-fitting door must be provided.

Dry-mash Hoppers.

It is most difficult to design a dry-mash hopper that is thoroughly efficient in all respects; however, the accompanying illustration will prove quite satisfactory. This hopper, being wider at the bottom than the top, tends to obviate the trouble of mash sticking up, which is so common in other designs. In addition, the lip on the feeding trough will prevent much wastage of mash. Such a hopper could be built in lengths to suit the number of birds, allowing 1 foot of feeding space to every ten birds. The feeding space, however, could be increased where all-mash is fed by allowing 1 foot to every eight birds.

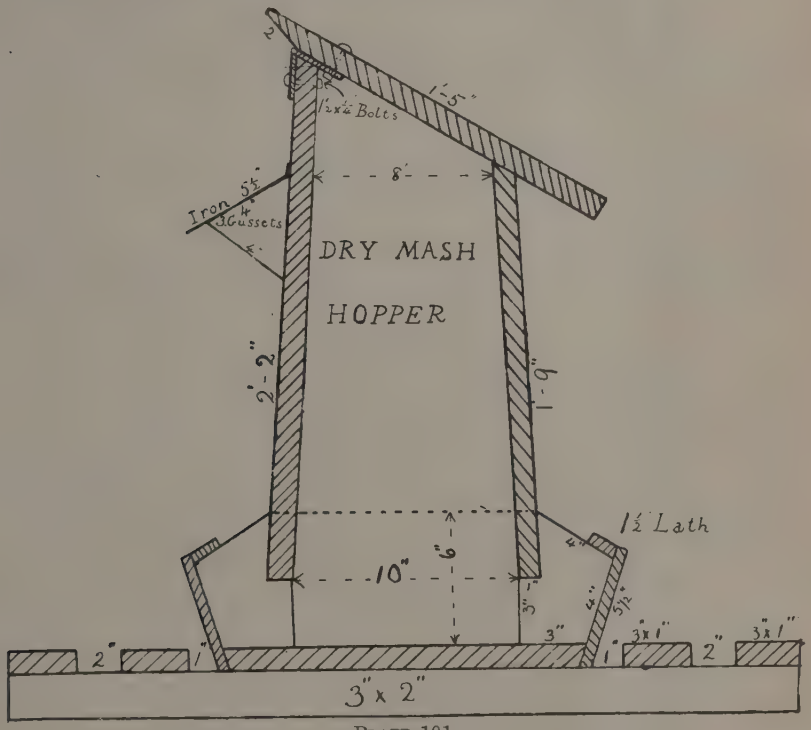


PLATE 101.

Wet mash should be fed in troughs or on a sheet of iron; after the birds have consumed the mash these receptacles should be stood up to avoid contamination.

Turkey Feeding.

No food should be given for at least forty-eight hours after hatching. Hard grit, charcoal, and water should be the first food provided. The hard grit assists in mastication, and charcoal has no equal as a bowel corrector. Turkey chickens will gorge themselves if allowed, and this

gorging is responsible for a considerable amount of trouble. Turkeys in their wild state would gather their food very slowly, and it is found best to imitate them as far as possible by feeding the young chickens only a little at a time, and fairly frequently. This prevents them from overloading their digestive organs, and helps to retain that keenness of appetite which is essential to success.

Stale bread soaked in milk and then squeezed fairly dry is the most handy food on the farm, and also gives excellent results. This can be fed five times a day for a few days, and variety can be added by the replacement of some of the meals with chick grains, mashes of bran and pollard mixed with milk, to which can be added a small amount of minced meat, and tender green feed. This mash should be made crumbly and not sticky.

When on range the quantities of food will vary according to what they can gather for themselves, but surplus milk can be fed at all times either thick or fresh, but it is as well to always feed it in the same condition. Green feed should be fed in abundance to both growing and adult stock, but where range is allowed on good green pasture it is not so important.

Grains should always be fed at night, and so induce the flocks to return to their camps. Oats, maize, and wheat are suitable for this purpose.

In the management of turkeys, especially in the rearing of young stock, cleanliness is essential. Food should not be allowed to lie about or become decomposed, and a strict outlook must be kept for vermin of all sorts.

Duck Feeding.

Ducklings require no feed for forty-eight hours after hatching. During this period they should have water, coarse sand, and charcoal constantly before them. A mash that will give good results if fed from the first meal until they are about four weeks old is prepared by mixing together—pollard, 10 lb.; maize meal, 8 lb.; dried butter-milk, 2 lb.; bonemeal, ½ lb.; fine salt, 2 ounces. If this mash was mixed, the amount for each meal could be moistened as required. Feed several meals daily—a little, and often, is a good motto. After four weeks they could be fed a mash similar to that fed to the adults.

Adults mash—

	Per cent.
Pollard	55
Bran	25
Maizemeal	10
Meatmeal	10
Bonemeal	1
Fine Salt	½

Feed growing stock three meals daily. With adults, a small meal of whole maize could be fed in the evening in addition to the mash. In fattening ducks, cheap foodstuffs in the form of potatoes, pumpkins, &c., could be boiled and added to the mash to the extent of 40 per cent. Chaffed young greenstuff should be added, but when using other cheap foodstuffs omit it, otherwise the mash would be too bulky.

Water.

Ducks must always have access to drinking water. This is *most important* with ducklings, and the water vessels should be deep enough for them to submerge their heads. Many ducks die annually, and the cause can be attributed to lack of water.

COMMERCIAL FOODS AND THEIR FEEDING VALUE.

Barley.

Not a popular food among poultry-keepers nor do fowls consume it readily. It has a fair feeding value, but in order to increase its palatability it should be soaked or sproated. When corn and wheat are high in price, barley could be used to the extent of 50 per cent. of the grain mixture, but the change over should be gradual.

Beans and Peas.

When whole, stock do not take kindly to either of these grains; crushed they add to the protein content of the mash, and may be used to the extent of 10 per cent.

The Grain Sorghum.

In the drier areas this crop can be grown successfully when maize or wheat are failures. They are slightly higher in protein content than maize, but do not contain the fats. Feterita and Milo are preferred, and are extensively used by some breeders with a good deal of success and economy in feeding. Some varieties of the grain, notably Kaffir corn, are credited with a binding effect on the bowels, but as an offset against this plentiful supplies of green feed can be used.

Maize.

This is one of Queensland's staple grain crops of which poultry are very fond. Large grain needs to be cracked, but the smaller varieties can be fed whole. When purchasing maize for grain feeding, it is as well to try and secure the small whole grain. The quality is then easily judged, and there is no waste. Cracked grain should always be sieved before being used, and the fine powder used in the mash. If the grain is fed extensively, it is inclined to lay on internal fat, but it can be used to the extent of at least 50 per cent. of the grain ration with safety. Yellow corn should be used in preference to the white on account of its content of vitamine A.

Oats.

In some places oats is one of the principal poultry foods. Most of Queensland's supply is, however, imported, and it therefore cannot be used economically in large quantities. It is, however, desirable to add variety to the ration of breeding stock by using a proportion of this grain.

Rice.

In the northern portion of Queensland, where this grain is grown, it may be possible to use quantities economically. It is a very starchy food of a fattening nature, but can be used to the extent of one-third of the grain ration. Crushed or ground rice needs to be used with care, owing to its tendency to go rancid.

Wheat.

This grain provides the bulk of our poultry food supplied. It is readily consumed by poultry, and can be fed as a part of any grain ration or used by itself, the market price of various grain foods available being the guide as to the quantities used. Plump wheats of a hard nature are of better feeding value than pinched grain or full soft grains.

Bran.

Bran is rich in protein and mineral matter, but carries a fair quantity of fibre. This fibre is useful in adding a certain quantity of bulk to the ration. It also assists in making a mash when fed wet of a nice consistency. Use at the rate up to 30 per cent. of the mash.

Pollard.

Pollard has a greater proportion of carbohydrates than bran, but not so much ash and fibre. It forms the principal constituent of mashes, and may be used to the extent of 60 per cent. of the total mash supply.

Maize Meal.

This meal is of especial value in fattening poultry. Certain quantities should be used in all mashes.

Ground Oats, Rolled Oats, and Hulled Oats.

Ground oats—that is, oats without the hulls—is an excellent food for both laying and growing stock, being rich in protein. The use of these foods is largely governed by the price.

Linseed Meal.

Fairly rich in oils and proteins, but contains a good deal of fibre. It may be used to the extent of 2 per cent. in the laying mash, and increased slightly during the moulting period.

Cotton Seed Meal.

Cotton seed meal, on analysis, would appear to be a splendid food for poultry, but in practice the extensive use has not given good results. A good grade may be used to the extent of 5 per cent., but never exceed this quantity.

Peanut Meal.

A very nitrogenous and easily digested meal. The keeping quality of the food is poor, being inclined to go rancid, but it may be used to assist in building up the protein content of mashes.

Meat Meals.

Meat meals vary considerably in their analysis. They are essential for high egg-production. The quantities to be used would vary according to conditions under which poultry are kept. In closed runs where no other class of animal food is available, they may be used to the extent of 10 per cent., but with stock on free range during periods when animal food in the form of insect life is plentiful, the quantity should be considerably reduced.

Dry Crushed Bone and Bone Meal.

These materials are essential for the development of the bony structure of young growing stock and beneficial to laying birds. Quantities up to 5 per cent. may be used. Poultry keepers who are a distance

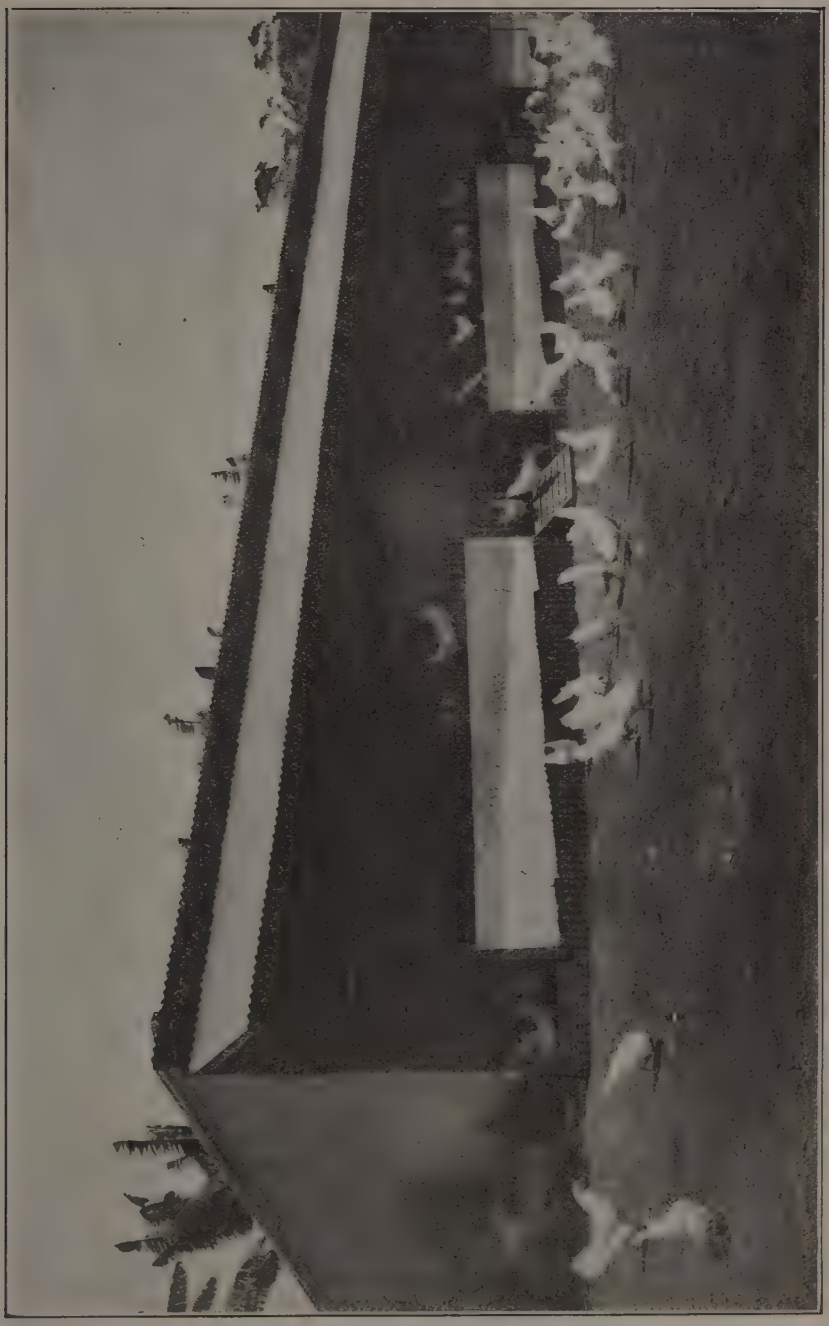


Plate 102.—An intensive laying house on a poultry farm near Brisbane, built according to the plan shown on page 169 of the February issue of the Journal.

from markets could burn any bones about the place, which renders them easily crushed, and so have a supply of mineral matter suitable for feeding to young growing stock.

Milk.

If all poultry keepers had a good supply of skim milk or butter-milk there would not be such a large number of poorly developed stock on our farms. There is no better animal food for stock than milk or milk products. In a sour state it is recommended by some authorities as preventative of diarrhoea and coccidcosis. In feeding, however, vessels need to be kept clean, and although the milk is being fed in a sour state, putrification needs to be avoided.

Dried Buttermilk.

This is an excellent food for those who have not the fresh product, and in a State such as Queensland, where the dairying industry is so extensive, poultry breeders should be assured of a continuity of supplies. Milk and milk products appear to be a tonic as well as a food, and highly suited for laying stock, growing stock, and breeding stock. When used for the latter purposes, it has been our experience that the hatchability of the eggs has been increased. It may be used as the sole source of animal food, or in conjunction with other forms of animal food. The price will govern its use.

Green Feed.

Some sort of succulent green food is essential to maintain the health and vigour of stock, not so much by reason of its nutritive value, although certain quantities are supplied, but to act as a natural tonic on the fowl's system.

It has long been recognised as an important food for poultry, but it is only during recent years that scientists have found that green foods have been supplying an element essential to life. Green feed stimulates the liver and increases the secretion of digestive juices. The kinds of green feed most valuable and relished by fowls are the young, tender-growing portions of lucerne, lettuce, kale, rape, silver beet, barley, oats, maize, &c. In fact, all green foods are good, but it should be young or tender. The quantity used is dependent upon supplies and general conditions. When feeding by itself, say, at midday, give the birds as much as they will eat. If used in a wet mash, the quantity could be as high as 25 per cent. of the bulk, and during droughty periods, when poultry foods are costly, green feed can be used to the extent of 60 per cent. of the mash; but when fed in these quantities, two mashes, one at 7 a.m. and one about 1 p.m., should be fed daily, followed by a grain feed, say, at 5 p.m. Poultry have not a great holding capacity, hence the necessity of feeding two mashes to enable them to deal with the necessary bulk to obtain all the nutriment required.

When fresh green feed cannot be obtained, lucerne chaff or meal make an excellent substitute. This class of food, being dry, however, cannot be used to the same extent as if green. By weight, 12 per cent. should be the limit. If feeding on the wet mash, the dry lucerne can be soaked over-night with just enough water to mix the mash. This softens the lucerne, making it more easily digested.

Grits.

Shell grit, limestone, or crushed bone, for the purpose of supplying the necessary material for bone and egg-shell formation, should be

provided. Plentiful supplies of oyster shell or ground lime should always be available, while bone may be supplied either in the form of meal or grit.

Hard Flinty Grit.

Hard pieces of rock, sand, &c., are necessary to poultry for the grinding of their food, and should also be in free supply, particularly with stock confined to pens. Without grit it is impossible for stock to thoroughly digest their food, and any system of feeding where this is not supplied is wasteful.

Charcoal.

This can be fed either in the mash or be available to stock at all times. When it is desired to feed powdered charcoal in the mash it should be used at the rate of 2½ per cent. Charcoal is valued for its mineral content and its action as a bowel corrector.

In feeding all grit continuity of supply is essential, otherwise stock are liable to gorge themselves, with resulting troubles in the nature of distended crops, &c.

Salt.

With a good system of feeding—that is, variety and plenty of green feed—there is generally a sufficient supply of salt to meet the body requirements, but small quantities, 8 oz. to every 100 lb. of mash, makes the food more palatable, with the result of greater consumption and production. Salt, however, needs to be well mixed with the mash; when wet mash is fed it can be dissolved in the water, but when fed dry too much care cannot be exercised in thoroughly distributing it throughout the mash, owing to its poisonous nature when excessive quantities are consumed by poultry.

Composition of some Poultry Foods.

Crude Nutrients.

Food.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Barley	8·6	1·5	71·0	2·7	2·2
Beans	25·4	1·5	48·5	7·1	3·2
Kaffir corn	9·9	1·4	74·9	1·5	3·0
Maize	9·5	4·0	69·3	2·8	1·4
Oats	10·3	4·8	58·2	10·3	3·1
Rice	7·6	1·9	66·7	9·3	4·9
Wheat	12·8	2·0	67·7	2·4	1·7
Bran	15·8	2·6	56·3	9·8	4·9
Cotton-seed meal (decort.)	41·0	7·0	29·0	8·0	6·0
Linseed meal (new process)	27·2	0·8	40·7	13·9	6·2
Maizemeal	8·6	3·7	71·4	2·0	1·3
Peanut meal	47·6	8·0	23·7	5·1	4·9
Pollard	15·7	3·6	61·4	5·8	3·1
Meatmeal	54·4	8·0	6·1	..	23·5
Skim milk	3·8	0·1	4·9	..	0·8
Dried buttermilk ..	34·5	1·1	49·1	..	8·3
Lucerne chaff	20·7	1·4	40·9	20·0	9·0

Queensland Weeds.

By C. T. WHITE, Government Botanist.

BLUE WEED OR PATERSON'S CURSE (ECHIUM PLANTAGINEUM).

Description.—An erect herbaceous weed, mostly 1 to 2 feet high, but sometimes much larger under favourable conditions of soil and climate; stems and leaves covered with rather long, stiff, scattered, rough hairs. Radical leaves large and sometimes dying-off in the older plants; stem leaves narrowly oblong in shape, cordate at the base, pointed at the apex, 2 to 4 inches long. Flowers purplish-blue, borne in dense clusters (one-sided cymes) at the ends of the main branches and upper side branches. Calyx green, hairy, divided nearly to the base into five segments, one-third to half an inch long. Corolla purplish-blue, but sometimes purplish-red, or even white, about 1 inch long. Stamens five, two of them longer than the others and exserted. Seeds (nutlets) borne in fours inside at the base of the calyx, small, only about 1 line in diameter, angular and very tuberculate (rough).

Distribution.—A native of the Mediterranean region, now a common naturalised weed in Australia. It is said to have first been introduced into Victoria as a garden flower about 1875, but it was not reported to be spreading as a weed until about 1896. From then on its spread in Victoria, South Australia, and New South Wales was increasingly rapid. It is difficult to say when it first came to Queensland, the earliest record in our collections is 1916, when we received specimens from Yandilla.

Common Names.—In New South Wales and Victoria it is commonly known as "Blue Weed" or "Paterson's Curse." In South Australia it is most generally known as "Salvation Jane." In England and America species of *Echium* are commonly called "Bugloss" or "Viper's Bugloss."

Botanical Name.—Echium, the ancient Greek name of a plant of this family, and derived from *Echis,* a viper, from the resemblance between the seeds and the head of a viper (J. C. Loudon); *plantagineum,* Latin in reference to some similarity of the leaves to those of the genus *Plantago,* which contains the plants variously known as Rib Grasses, Plantains, Lamb's Quarters, &c.

Properties.—It is not known to possess any harmful or poisonous properties. The first leaves are succulent and palatable, and stock will eat them readily enough, but the plant soon becomes harsh and is left entirely alone. I have heard it spoken well of as a bee plant.

Eradication.—At the present time the areas infested in Queensland are probably not so great but that they can be hand-treated by cutting off the plants well below the surface of the ground.

Botanical Reference.—Echium plantagineum Linnaeus Mantissa II., 202.

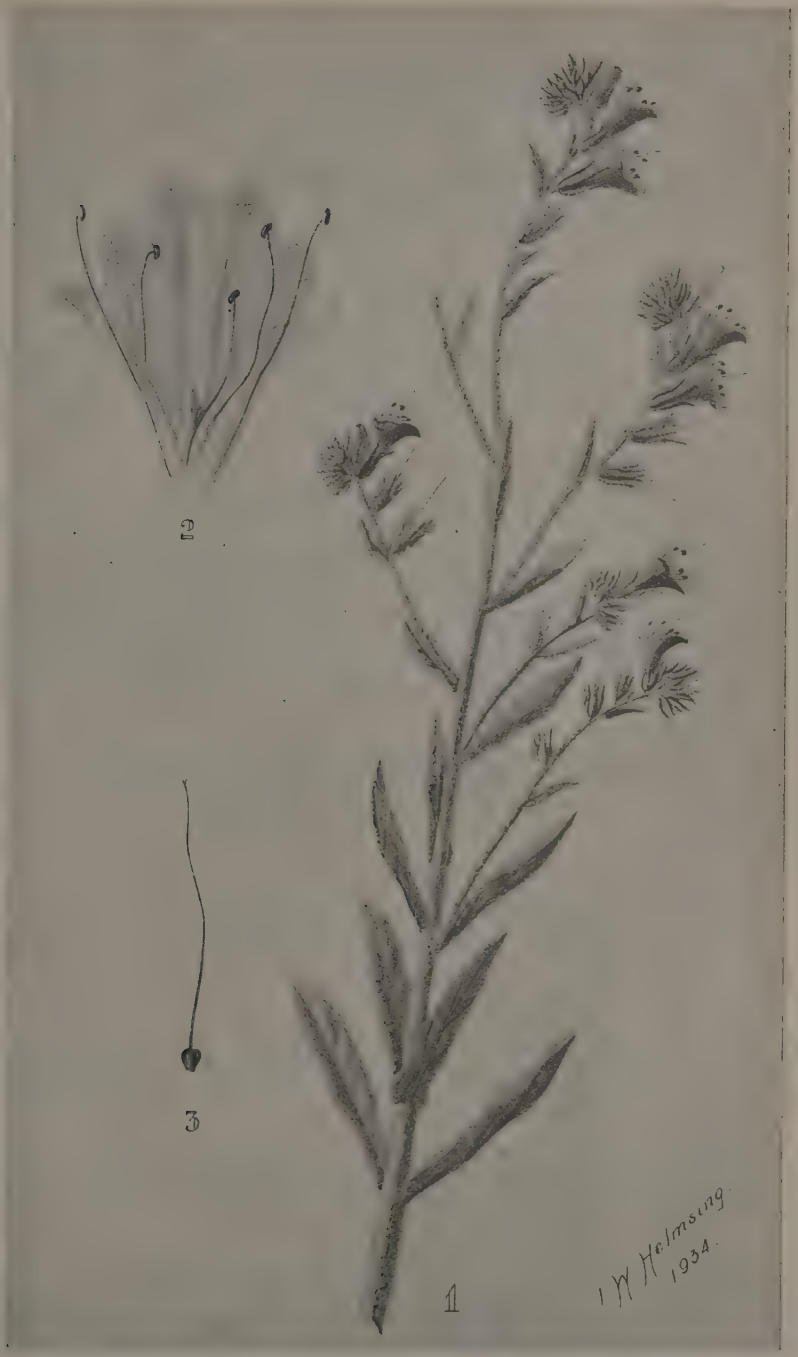


Plate 103.—Blue Weed or Paterson's Curse (*Echium plantagineum*).
1. A flowering stem (approximately half natural size). 2. Flower (Corolla) laid open × 2. 3. Pistil × 2.

Agricultural Notes.

By H. S. HUNTER, Agricultural Branch.

SEASONAL PROSPECTS.

UNLIKE the two preceding seasons, the normal late-summer rains, on which so much depends for the winter months, have not failed to materialise. Copious and widespread rains in February, over practically the whole of the State have guaranteed a continuance of the favourable season. Since April, 1933, when belated monsoonal rains brought relief from a severe dry spell, the agricultural areas of Southern Queensland have received rains at frequent intervals, which came, in many cases, at an opportune time to prevent any serious setback to the growing crops. Since the breaking, last year, of the long drought in the Central district, that area also has experienced a run of favourable weather.

Last month's general rain resulted in the disappearance of the remaining stronghold of drought, in the Winton-Hughenden area, and pastoral and agricultural Queensland now is in such shape as to view the approach of the autumn and winter months with confidence. Provided the appropriate farming operations for the system of short-fallowing and moisture conservation are given effect to, the advent of seasonal rains in late summer has an important bearing on the successful growing of winter cereals, in that the autumn and winter months normally do not yield sufficient moisture for the needs of wheat and like crops.

It is inevitable that some damage would be sustained by heavy rains at the present time, especially in the agricultural districts. Severe flooding occurred on two occasions during the month in parts of the far North Coast.

Sugar.

Continued rains in the far North provided conditions which were favourable for crop growth except where the control of weeds has not been possible. Temperatures have been abnormally low throughout February, so that the cane growth has not been so vigorous as is normally experienced at this season.

In Mackay and Bundaberg a dry spell was experienced in mid-February which caused a temporary check to the cane crops, but the beneficial rains of the past week have enabled them to recover, and good yields may now be expected in these districts.

Early forecasts for Queensland as a whole suggest that a further heavy crop will be harvested; it is as yet too early to state whether it is likely to exceed that of 1933.

Maize.

Extended areas and a favourable growing season are factors which indicate that a heavy yield may be expected this season. Some losses may have been sustained in low-lying areas in the coastal districts from floods, especially where the maize had lodged from the effects of previous heavy rains.

Harvesting of the mid-season crop now is general, particularly on the Darling Downs, where extended plantings were made this season. Consignments totalling 200 tons of maize, mostly to Southern States, are reported to have left the Allora district alone within the first two weeks of the month.

Continuous wet weather hampered planting operations on the Atherton Tableland, where the area under maize is estimated at 16,000 acres, or 4,000 acres less than last season.

Cotton.

The late February rains were urgently needed in most cotton-growing districts to develop the top crop of bolls, and it now is practically certain that a record yield for the State will be obtained. With average conditions for the rest of the season excellent crops are expected, especially in the Upper Burnett, where a large acreage of medium to late-planted cotton exists.

Where proper cultural practices have been adopted, good yields from early-planted crops also are in prospect. Many nicely developed early planted crops are to be seen in the Mundubbera and Callide Valley districts.

An outstanding feature of the season, in most districts, is the pronounced freedom from attacks by the corn ear worm, which often has caused damage in past years. The lack of damage is noticeable particularly where clean cultivation has been maintained. Where severe attack from corn ear worm occurs, it frequently is found that the fields are infested with pig weed and bull head, both of which weeds are attractive to the moth of this pest.

The ginneries now are open for receipt of consignments of early cotton, which is being harvested in the Central district. Harvesting should be more general within the next few weeks and will extend to about July at the earliest.

It is pleasing to note that arrangements have been made whereby it will be possible for the Australian cotton spinners to contract to buy 12,000 bales of cotton from the coming harvest.

Tobacco.

The season, so far, has been most discouraging for the tobacco grower due, principally, to the difficulty of raising seedlings, owing to the prevalence of blue mould. The infestation of this disease has been particularly severe in most districts, the humid conditions having been conducive to its development.

In many cases where the Department's recommended preventive sprays have been carefully used, success has attended the efforts to raise seedlings, but very often these measures have been rendered ineffective by rain washing the spray material from the plant.

In the Mareeba district, plantings which were effected in November and December have reached the curing stage and are resulting in the production of exceptionally bright leaf, with an encouraging absence of the spotting trouble which was so prevalent during the past two seasons.

However, in the majority of instances, shortage of plants has unduly delayed transplanting, and at the commencement of the month the area planted would not exceed 600 acres, or less than half the area planted at the corresponding time last year.

In the tobacco areas to the hinterland of Townsville, blue mould interfered with planting operations, notably at Hervey's Range, where the growers are endeavouring to raise a fresh lot of seedlings in time for planting out. Better success has been obtained in the Woodstock, Sellheim, Ravenswood, and Charters Towers districts, where some of the crops have made excellent and uninterrupted growth with a noticeable absence of leaf spot.

In the Southern areas, the delay in transplanting is more serious, owing to the danger that the crops will encounter frost. Blue mould has been the main trouble at Beerburrum, Park Ridge, and in the Texas and Inglewood districts. In the latter two areas, where tobacco is grown under irrigation, the unusually heavy rains have caused losses in the field from stem rot.

Numbers of growers, chiefly share-farmers, have ceased operations in the Texas and Inglewood districts and this fact, together with losses from disease, has accounted for a considerable reduction in the collective area, which is calculated at about 450 acres or less than half that of previous seasons.

Leaf, which is now being cured from the early plantings, is showing better colour than usual.

TOBACCO—TOPPING AND SUCKERING.

The main object of topping and suckering tobacco is to hasten maturity. These practices are also important factors in the production of quality leaf, writes the Tobacco Expert of the New South Wales Department of Agriculture in current notes.

The natural thing for the tobacco plant to do is to set seed, but by removing the flower head (i.e., topping) as soon as it appears, seed setting is prevented and much of the plant-food material that would have been used up in seed formation will be made available for leaf development. Tobacco plants that are allowed to go to seed or produce suckers have thin papery leaves of poor texture, body, and weight.

Topping results in lateral shoots soon making their appearance at the leaf axils and at the base of the plant. Naturally, if these are not removed they also will develop and set seed heads at the expense of the tobacco leaves.

To determine at what height the plants should be broken off it is essential that the vigour of the plant be first carefully observed, and the earliness or lateness of the season should also be taken into account. Then, too, the question of obtaining uniformity in ripening over a fair area of the crop to facilitate an even and sufficient picking for flue-curing must be considered.

With well-grown and early light and bright types of tobacco it is usual to leave about fourteen or fifteen leaves to come to maturity. With late tobacco it is often advisable to leave only nine or ten leaves, excluding the damaged bottom leaves.

Many growers do not fully realise the damage they are doing to their crop in allowing suckers to grow too large. Suckers should be removed as soon as they can be conveniently grasped in the fingers and not permitted to grow longer than 2 inches.

Seasonal Notes.

By H. W. BALL, Assistant Experimentalist, Agricultural Branch.

CULTURAL operations in the wheat areas will now be well advanced, and care should be taken to see that workings become shallower as seeding time approaches.

Spring tooth and rigid tine cultivators are preferable to disc implements for working the fallows.

A late disc cultivation does considerable harm by spoiling the necessary consolidation.

If sheep are given access to the paddocks, they can be of great assistance in keeping down weed growth, thereby reducing cultivation and helping to consolidate the soil.

By efficient cultivation much of the heavy summer rainfall can be conserved for use by the future crop.

Where wild oats are a problem and it is not desired that bare fallowing should be resorted to, the infestation can be reduced by sowing an early maturing crop of rye, barley, or wheat as a fodder crop, to provide grazing for sheep, and to be subsequently ploughed in before any grain ripens.

Or, alternatively, the land can be well worked to encourage the germination of the wild oats, which are then cultivated out, and a late sowing made with a suitable variety of wheat.

Suitable varieties of wheat may be sown towards the end of April for hay purposes.

Varieties such as Cleveland and Currawa are also sown with a view to feeding off during early growth to sheep.

The main sowing of lucerne should be made during the March-April period.

Lucerne prefers a fine, well-prepared seed-bed, preferably in a calcareous soil, and the value of the crop well repays a little extra trouble at the beginning.

As weed growth is not so pronounced during the winter months, the young lucerne has an excellent chance of becoming established if sown at this time.

It has been found that lucerne is a valuable crop to sow for grazing in the outlying farming areas and pastoral country, having a rainfall in the vicinity of 20 to 25 inches per annum.

A light seeding of 3 to 4 lb. per acre is sufficient to produce a stand, which, if judiciously grazed, will carry considerably more stock per acre than the natural pastures, particularly during the winter months.

CAULIFLOWER CULTIVATION.

SUPPLIED BY THE FRUIT BRANCH.

THE colder months are the best for the growing of cauliflowers, and it is necessary, therefore, to plant out in time to ensure their heading during that season.

In the southern coastal districts the planting of the seed is done between February and April, the Tableland districts from February to May, and the inland districts from February to March. In the northern district from February to May on the coastal, inland, and tableland areas.

Cauliflower plants are usually raised in seed-beds. The beds should be well prepared, and if the soil is too heavy it may be improved by adding other soil of a sandy nature. The soil should be finely raked and the seed sown in drills about a foot apart and covered with about a quarter of an inch of soil or well-rotted manure. When the young plants appear they should be kept well watered, and within four or five weeks they should be ready for planting out. This is best done under moist conditions. Care is essential in removing the young plants from the beds, and the young roots of the plants should be kept moist at all times.

The Agricultural Chemist in his pamphlet on complete fertilizers states:—Cauliflowers require a very rich loam and a heavy dressing of farmyard manure.

When using from 10 to 15 tons of stable manure per acre, when the ground is being prepared, the following mixture of artificial fertilizers should be applied per acre when planting:—

3 to 4 cwt. of nitrate of soda.
4 to 6 cwt. Nauru phosphate—superphosphate mixture.
1 to 2 cwt. sulphate of potash.

The latter to be applied in top dressings. Without farmyard manure use, per acre—

4 cwt. of nitrate of soda or sulphate of ammonia,
6 cwt. of Nauru phosphate—superphosphate mixture,
2 cwt. sulphate of potash

when planting, and two or three top dressings of 1 cwt. of nitrate of soda each.

While the plants are growing, cultivation should be thorough but should cease when they begin to head, because cultivation at this stage causes the head to become loose and coarse.

To keep the head white it is necessary to protect it from the sun, and this is done by tying the tops of the leaves together over the head as soon as it begins to form. Cutting the heads for market is best done in the morning, and care must be taken not to bruise them, for each bruise appears as a black mark.

Cauliflowers should not follow a cabbage crop or occupy the same ground for two consecutive seasons. Cauliflowers are usually planted in rows 3 feet apart, with 2 feet between the plants, and 1 lb. of seed planted in drills is sufficient to plant an acre. Varieties recommended are Primus, Early and Late Phenomenon, and Eclipse.

CARE NEEDED IN BRANDING PIGS.

Reporting to its shareholders recently, the North Queensland Co-operative Bacon Association, Limited, advised that an appreciable number of the pigs forwarded for slaughter have been treated too severely in branding, the branding having been carried out too heavily, causing loss in the finished article, hams and bacon, through the manufacturer having to cut out the portion which has been too deeply branded, thus reducing the commercial value of the side, flitch, or ham respectively.

Improper fire branding of pork and bacon pigs inflicts a heavy loss on the bacon trade annually. It has been definitely proved that body tattoo branding is much to be preferred to fire branding, and this system is now being advised by the majority of factories and is practised by all the principal buyers of market pigs.

COLD STORAGE OF FRUIT—KEEPING QUALITIES OF DIFFERENT VARIETIES.

It is well known, observes a pamphlet issued by the New South Wales Department of Agriculture on the cold storage of fruit, that the keeping quality of similar varieties of fruit grown in the same orchard does not remain constant. It may vary from season to season. It depends upon (*a*) soil, (*b*) rainfall, (*c*) care in handling, (*d*) size of fruit, and possibly upon other factors.

Generally speaking, if the cool store is operated upon proper lines, very little loss will occur, always supposing that the fruit has been picked at the right stage of maturity and handled carefully, and that conditions were studied carefully during the growing period. When light crops are harvested and the fruit is large it will not keep so well as when the crop is normal and the fruit is of medium size. Since heavy rain immediately before picking prejudicially affects the keeping qualities of fruit, in a wet season careful watch should be kept on the fruit in storage. It is recommended by some that in such a season the temperature in the cool chambers should be maintained slightly higher than in a season of normal rainfall.

The information at present available concerning the keeping quality, &c., of the different commercial varieties of fruits is summarised as follows:—

APPLES.

Jonathan.—A good storer if picked when well coloured. Large fruit goes "sleepy" if held any length of time. Jonathan spot causes losses and should be closely watched. This variety does not scald to any extent.

London Pippin.—Holds until November if picked when the ground colour is changing and placed in store straight from the tree.

King David.—Stores well in some seasons, but not a very sound variety to rely upon.

Delicious.—If picked when well coloured and placed in store straight from the tree, it will hold up well till October or November. Flavour improves in store.

Tasma.—A splendid storer, which keeps well till the last, except oversized fruit from young trees, which goes "sleepy."

Yates.—A splendid storer, which keeps to the last.

Dougherty.—Stores well sometimes, but not a very sound variety.

Granny Smith.—The general practice is to pick this variety in April and leave in well-ventilated stacks until June, by which time the skin develops an oily feeling. The fruit is then wrapped in oiled paper and placed in store. It holds well till December. This variety should never be stored except in oiled wrappers, otherwise scald is likely to develop when the fruit is removed from the store.

Rome Beauty.—Stores satisfactorily when well coloured, but should not be held too long.

Rokewood and Grafton.—Both store very well.

Stayman Winesap.—Goes "sleepy" if held too long and consequently should be cleaned up by the end of July.

For long storage, apples and pears should be picked at the right stage for the variety, and after being allowed to cool down overnight placed straight into cool store. Delayed storage is satisfactory only as regards the Granny Smith and is fairly satisfactory for the Tasma, although the latter will hold longer if put straight into the store after picking.

PEARS.

Williams'.—Stores well for one or two months, but is risky beyond that time.

Packham's.—One of the best storers, but should have a tinge of yellow before picking, and should go straight into the store.

Winter Cole.—One of the best storers, but should go straight into the store from the tree if intended to hold for long.

Josephine.—Ripen quickly when they start and consequently should be closely watched. A very good storer.

Winter Nelis.—Very good storer.

Howell.—Liable to skin blackening on removal.

Beurre de Capioumont.—Hardly worth holding.

Beurre Bosc.—Holds well for short storings.

Glou Morceau.—A tender skin variety, holds well, liable to blackening or marking after removal from store.

PLUMS.

Although the time for picking plums is not so important as in the case of peaches, they should not be picked too early. A slightly acid taste seems best to define this condition. President is the most satisfactory storer, while Grand Duke and Pond's, and in fact most European plums, will hold well for short storage—three or four weeks.

PEACHES.

Picking at the correct time is a most important factor. Some varieties of peaches are characterised by a definite ridge, which is the first portion to become soft at ripening. Such a variety should be picked about a day prior to softening, which stage should be judged by the eye and not tested by pressure.

HISTORY OF SUGAR.

In an address before a Sydney popular science club, Mr. P. H. Goldfinch, general manager of the Colonial Sugar Refining Company, traced the history of sugar from the year 337 B.C., when the soldiers of Alexander the Great in India found the natives chewing sugar-cane, which they called "the honey-bearing root."

The earliest evidence of sugar being consumed in solid form, said Mr. Goldfinch, was found in Persia in the year 627 of the Christian era. It was introduced into Egypt and from there crossed the Mediterranean, and spread along the coastal areas as far as Spain. Up to about the year 1400 the juice was squeezed out of the sugar-cane by hand, and was concentrated by being dried in the sun. The Venetians, however, developed a process of refining the crude and sticky mass, and they turned out quite a respectable crystal sugar. They kept the process a close secret, but eventually gave it away. The people of Great Britain developed a taste for this new and pleasant form of food. After purchasing crude sugar from foreign countries they refined it in England for consumption for those who could afford to buy it. In 1688 fifty small sugar refineries were operating in Great Britain. The method of manufacture was very haphazard, and continued to be comparatively primitive until sixty years ago. At that time 14 tons of cane was required to make a ton of crystal sugar, whereas to-day, 1 ton of superior sugar is made from 7 tons of Australian-grown cane.

Mr. Goldfinch said that in 1817 Thomas Scott attempted unsuccessfully to establish canegrowing on the Hastings River. No further attempt was made to produce sugar commercially in Australia until about 1852, when Captain Hope made the first sugar from Australian cane grown in Brisbane, and manufactured in a hand mill. In 1877 there were sixty-eight small sugar mills in Queensland, mostly horse-driven, and thirty mills on the Clarence River in New South Wales. Not one of them was in existence to-day, their places having been taken by thirty-seven large, powerful, and up-to-date mills which produced about one hundred times as much sugar as the whole ninety-eight mills did formerly.

The people of Australia consumed about 320,000 tons of sugar a year, said Mr. Goldfinch. It was all produced in Australia—about 96 per cent. in Queensland. Australia made from 500,000 to 550,000 tons a year, and the surplus was sold to Great Britain and Canada.

PLATE 104.

MORNINGSIDE (BRISBANE) STATE SCHOOL PROJECT CLUB,

on a visit to the Department of Agriculture and Stock. Standing in the rear is Mr. Robt. Wilson, Assistant Under Secretary, and seated in the centre (left to right) are Messrs. Rumball (Poultry Expert), Krause (Teacher in Charge), and Reid (Editor of Publications).

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Book of the Jersey Cattle Society, the Australian Illawarra Shorthorn Society, and the Guernsey Cattle Society, production charts for which were compiled for the month of January, 1934 (273 days period unless otherwise stated):—

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	JERSEY.			
	MATURE COW (OVER 5 YEARS), STANDARD 350 LB.			
Pineview Buttercup	J. Hunter and Sons, Borallon	7,886·05	427·17	Carnation Lad
Carnation II. of Woodlands	D. R. Hutton, Cunningham	7,029·25	380·276	Cream Sultan of Rosedale
Princess II. of Ferndale	D. R. Hutton, Cunningham	7,584·0	374·056	Janet's Palatine of Rosedale
	SENIOR, 4 YEARS OLD (OVER 4½ YEARS), STANDARD 330 LB.			
Carnation's Pride of Calton	L. A. Peirce, Graceville	9,220·22	435·723	Retford Meteor
	JUNIOR, 4 YEARS OLD (UNDER 4½ YEARS), STANDARD 310 LB.			
Pineview Locket	J. Hunter and Sons, Borallon	6,754·64	386·394	Oxford Buttercup's Noble
Countess III. of Woodlands	D. B. Hutton, Cunningham	7,426·98	347·48	Carnation Golden Duke
Oxford Erin (269 days)	E. Durton and Sons, Wanora	5,549·66	322·37	Oxford Renown
	SENIOR, 2 YEARS OLD (OVER 2½ YEARS), STANDARD 250 LB.			
Trecarne Milk Girl III.	D. R. Hutton, Cunningham	6,636·32	370·953	Trecarne Golden King
Canary II. of Fernlea	Kittle Bros., Glencagle	5,767·13	335·083	Norwood Noble Boy
	JUNIOR, 2 YEARS OLD (UNDER 2½ YEARS), STANDARD 230 LB.			
Pineview Myrtle	J. Hunter and Sons, Borallon	4,932·85	295·856	Oxford Buttercup's Noble

AUSTRALIAN ILLAWARRA SHORTHORNS.

Mature Cow (over 5 Years), Standard 350 Lb.

Redberry of Rosehill	W. Flesser, Boyland	11,965·59	440·784	Master of Oakvale

Junior, 4 Years Old (under 4½ Years), Standard 310 Lb.

Woranga Frances II.	R. Ray, Yargullen	8,138·0	367·034	Young Charmer of Newholme

Junior, 3 Years Old (under 3½ Years), Standard 270 Lb.

Cinderella of Oakvale	B. O'Connor, Colinton	9,876·7	432·129	Kitchener 2nd of Burradale
Beauty of Oakvale ..	B. O'Connor, Colinton	9,048·35	367·022	Kitchener 2nd of Burradale
Rosehill Gentle II. ..	W. Flesser, Boyland	7,592·82	274·73	Phinquil of Oakvale

GUERNSEY.

Junior, 3 Years Old (under 3½ Years), Standard 270 Lb.

Moonji Dodo Perfection	W. R. Smee, Peeramon	5,857·75	323·111	Caramara Favour

Answers to Correspondents.

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. Cyril T. White, F.L.S.

Derris trifoliata.

I.B. (Townsville).

Derris trifoliata is fairly common in North Queensland from about Mackay northwards. It is a scrub or rain forest climber, and the stems are used by the natives as a fish poison. It bears three to five leaflets and sprays of pea-shaped flowers. If you think you see it in the local scrubs at any time you could forward specimens for identification. *Derris trifoliata*, so far as we know, is not a marketable product and nobody is collecting it. We believe the only species at present collected commercially is *Derris elliptica*, the Tuba Root of Malay, and Singapore is the chief port of export.

Blue Panic Grass.

J.W. (Guluguba)—

The Blue Panic Grass, *Panicum antidotale*, does not, so far as we know, contain any prussic-acid-yielding glucoside at any stage of its growth, and is not known to be poisonous or harmful in any way. The feed value, we should say, is unquestionably high, and the grass, though somewhat cany in nature, has one good feature: that is, it sends out tufts of leaves all up the stem, and these tufts provide young, nutritious feed.

The important point in pasture management nowadays is to have young, short, succulent grass, but, as you know, in the West this is almost impossible, because you would have short grass at one time and no grass at another. A certain quantity of standing feed is essential.

We have read of your experiments with grasses with great interest. Among those you are trying, have you tried *Phalaris tuberosa*. This makes a wonderful winter feed and should be sown in the autumn, but stock have to be kept off it until it is established.

Coastal Button Grass.

J.A.O'S. (Carruchan)—

The specimen is the Coastal Button Grass, *Dactyloctenium ægyptium*, a grass very widely spread over the warmer regions of the world. It has been established in North Queensland for a number of years past, and of late years seems to be on the increase. We have not had much experience with this grass as a fodder, but reports so far received seem to indicate that it is palatable and nutritious. The grass grows well during the summer months and dies out on the approach of the colder weather.

Sword Bean and Jack Bean.

G.H.B. (Bouldercombe)—

Your specimen is the Sword Bean, *Canavalia gladiata*, the common tropical bean cultivated to a limited extent in Queensland. The bean should be used with caution, as it does not apparently suit all stomachs, but we know of many cases of people who have used the young pods sliced in the same way as French Beans and who have said they were excellent. A far better variety is *Canavalia ensiformis*, the Jack Bean. This bean we have cultivated ourselves and used the young pods in the same way as French Beans, and the nearly ripe seeds in the same way as Lima Beans. We are sending you a few seeds under separate cover, in case you may like to try this variety.

Good Fodder Grass *(Leptochloa decipiens.)*

E.R.W. (Inglewood)—

The specimen is *Leptochloa decipiens*, a grass with a fairly wide distribution in Queensland, but nowhere, we should say, very abundant. It seems to favour rather sheltered positions, such as on the edge of brigalow scrubs, &c. It is quite a good fodder and seems to be readily eaten by stock. It possesses in rather a faint degree a prussic-acid-yielding glucoside, but apparently not in sufficient quantities to cause any trouble.

Broad-leaved Carpet Grass.

H. (Maryborough)—

The specimen is *Axonopus compressus*, the Broad-leaved Carpet Grass, a native of the Southern United States and tropical America, now naturalised in most tropical and sub-tropical countries. It has been established in Queensland for a great number of years, but only comparatively recently has it become common in the more southern parts of the State. The grass probably has value for dairying purposes on second-class country, particularly near the coast, but is not to be favoured where better grasses, such as Paspalum, Rhodes grass, &c., can be grown. A great deal of controversy has centred around this grass of late years, and in two parts of the State requests have been made to investigate its spread into the Paspalum pastures, the claim being that, in closely-grazed pastures, when it makes its appearance it dominates the pasture, making it, in comparison, almost useless. In America the grass is spoken quite highly of, and pastures of it are laid down, but the general experience in Queensland is that, though it may have value on second-class country, there is a danger it will invade and dominate first-class country to the exclusion of Paspalums, clovers, and better class pasture grasses and herbage generally.

Japanese Clover.

G.W.C. (Gympie)—

The specimen is *Lespedeza striata*, Japanese Clover. This, and other species of *Lespedeza*, have attracted considerable notice as fodders of recent years. Have you any idea how the present plant came to be on your property? Though supposed to be of only recent introduction, we have received specimens of this particular plant this year from Caboolture, and it is reported to be growing wild there. Reports from abroad seem to speak highly of the plant, but in Queensland as yet we have had no actual experience with it as a fodder. It is a legume, however, and should be quite nutritious and a valuable introduction to the pasture. Your specimen bore no seeds or flowers, and later on we would like further specimens to verify the determination.

Cultivation of Mitchell and Flinders Grasses.

J.C. (Fernlees, C.Q.)—

We have visited the property of Dr. Hirschfeld at Bybera, near Inglewood. He has made a great success of the cultivation of Flinders grass and Mitchell grass. An acre of Flinders grass on ploughed land is a picture. It shows that this grass can be grown over a much wider range than is generally supposed.

Creeping Saltbrush.

H.H. (Gladfield)—

The specimen is *Atriplex semibaccata*, commonly known as Salt Weed or Creeping Salt Bush. It is fairly common on some parts of the Downs, particularly on the western Downs, and is generally regarded as quite good fodder for stock. Stock often do not take to these Salt Bushes when other feed is available, though sometimes they will acquire a liking for them and keep them well cropped down, even though other feed is available. They often prefer them somewhat when they are drying off to when they are growing in a very luxuriant state.

Townsville Lucerne.

H.C.H. (El Arish)—

The specimen is *Stylosanthes mucronata*, the Townsville lucerne. This plant has been naturalised in North Queensland for many years, and its introduction in many places has no doubt considerably increased the carrying capacity of the pasture. We do not think there is much fear of its becoming a weed in the canefields, as it is growing in many cane areas and no trouble has been experienced from it so far. It is a legume, and ploughed in should make quite good green manure. It is also, we should say, fairly easy of eradication. It grows during the summer months, seeding and dying off on the approach of the colder weather, say, about April or early March. The plant is relished by stock when it is drying off somewhat—in fact, they often seem rather to reject it when very green and luxuriant.

White Root.

B.D. (Murgon)—

The specimen is *Lobelia purpurescens*, the White Root, a native plant that sometimes becomes a serious weed in cultivation. It is one of the most pernicious weeds we have, and the most difficult to eradicate. The only means of eradication that we know is to keep on regularly checking the green growth above the ground, so that the underground parts must eventually become exhausted by rapidly sending up fresh shoots and getting no nourishment in return. When the roots are dug up, care should be taken that they are gathered together and destroyed, for every little piece that falls or is broken and remains in the ground makes a new plant. Sprays, as a general rule, are not very satisfactory when applied to these plants, and in any case they are rather difficult to spray in garden beds where other plants are present. If the bed is vacant, you could spray with a weak weedicide, such as a weak arsenical solution. If there is any objection to using a poisonous spray, you could dig the plants up and spray the exposed roots and any green parts with, say, a solution of common salt, or with kerosene. Salt must be applied in dry weather to be effective. If the roots are sprayed with kerosene and then burnt this is a great aid.

Honey Locust.

J. O'N. (Gayndah)—

The specimen forwarded is *Gleditschia triacanthos*, the Honey Locust, a native of North America. The pods are said to have some reputation as a fodder. We have no experience of the effect of the foliage on milk and cream, but should not think it would taint them any more than a lot of other green fodders, such as lucerne, &c. The plant is not known to be poisonous or harmful in any way. In Queensland it is mostly planted in the cooler parts of the State, particularly on the Darling Downs. It is deciduous, and, like some other legumes, is rather subject to borer attack.

African Box Thorn.

THE SHIRE CLERK (Cloncurry)—

So far as we know, *Lycium afrum*, the African Box Thorn, is not growing in your shire. As far as Queensland is concerned, the only places where we have seen it as a pest are a few places on the Darling Downs and in the Maranoa district. We think it was at the instigation of some of the people in the latter district that the plant has been declared a noxious weed throughout the State. It has spread very much in some of the Southern States, particularly in South Australia, and fears are entertained regarding its spread in parts of Queensland. At the present time, we have no leaflet dealing with it, but the following description may help you:—It is an upright growing shrub, 4 to 6 ft. high, the branchlets ending in stout, strong spines. The leaves are small, rather thick, and slightly fleshy. The flowers are cup or bell shaped, and white, veined with violet. The fruit is a bright red round berry, containing numerous small seeds. It is half an inch or nearly half an inch in diameter.

A Poisonous Plant.

H.M. (Red Hill)—

The specimen is *Euphorbia tirucal'i*, a native of northern Africa and western Asia. The milky sap of the plant is an intense irritant, is poisonous, and it is very dangerous to have the plant growing where there are children. If the sap gets into the eyes it causes intense pain and temporary blindness.

Pigeon Grass.

C.H.H. (Kingaroy)—

The specimen is *Setaria glauca*, a grass very widely spread over many of the warmer regions of the world, and commonly known as Pigeon Grass. It is quite abundant in parts of Queensland, mostly growing either in damp situations or as a weed of cultivation. It is quite a good fodder and belongs to the same genus as such well-known cultivated fodders as Hungarian Millet, Panicum, &c.

Florida Beggar Weed.

H.T.P. (Tulagi, British Solomon Islands Protectorate)—

As far as can be told from the single specimen, we think the plant is *Desmodium tortuosum*, the Florida Beggar Weed. It is asked if there is any difference between *Desmodium triflorum* and *Desmodium trifolium*, but we cannot trace the latter name in any literature at our disposal. The plant does not belong to *Desmodium triflorum*, but to *Desmodium tortuosum*, as stated before. The plant is a legume. It has considerable reputation as a cover crop for enriching the soil, and as a cattle fodder. It grows to a great height under cultivation, but soon deteriorates into a very poor weedy plant, especially on poorer soils. I think the plant is worth growing as a cover crop and a cattle fodder in the Solomon Islands, but its value can only be told by experiment. Florida Beggar Weed is much cultivated as a fodder crop and green manure in many tropical and sub-tropical countries. It is grown to a very limited extent in Australia.

Dysphania myriocephala.

W.R. (Warra)—

The weed is *Dysphania myriocephala*, and is very common in many parts of Queensland, though we have not heard a common name applied to it. The plant is decidedly poisonous, containing a prussic-acid-yielding glucoside. It would be particularly fatal to travelling stock which came on to it fairly hungry, for they would naturally eat it in large quantities.

Beautiful Tree for Street Planting (*Barklya syringifolia*).

H.P.J. (Wooroolin)—

The tree, *Barklya syringifolia*, would make a very beautiful street tree for planting in the Kingaroy district. It is an evergreen. We should think it would be frost tender in its younger stages. A well-grown tree would be about 25 to 30 ft. high. About 30 ft. apart would be a good distance to plant the trees. So far as our experience goes, this tree is of rather slow growth in its younger stages.

Crowfoot Grass.

T.T. (Birkdale)—

The specimen is *Eleusine indica*, Crowfoot Grass, fairly common in Queensland, but widely spread over the warmer regions of the world. It is essentially a weed of cultivation and waste places, and comes up on farms and cultivation headlands, around cow yards, &c.—in fact, anywhere where the ground has been disturbed or made bare. It is eaten by stock, but we would not say it was of much value as a pasture grass. Like members of the Sorghum family, it contains a prussic-acid-yielding glucoside, though we cannot say that any deaths caused by it have come under our notice in Queensland.

Immature Crops Bad for Pigs.

A.T. (Toowoomba)—

With reference to feeding of store pigs on young saccaline, the Agricultural Chemist, Mr. E. H. Gurney, advises:—"In young stages of growth of the saccaline variety of sorghum, it usually has a high prussic acid content. As a second checked growth is likely to occur when grazed by pigs, it is considered this practice would be attended with danger."

The Senior Instructor in Pig Raising, Mr. E. H. Shelton, advises:—"Our own experience is that it is unwise and unprofitable to allow pigs of any description to graze on immature crops, especially where there is a danger of poisoning. In the case of saccaline, it is the thick juicy stalks that have maximum feeding value, the crop being grown for that purpose and not for the leaf growth, as in the case of wheat, oats, and barley, where they are grown for use in the leafy form and not as grain. We have also had reports of danger attending the feeding off of second-growth corn stalks—that is, the young shoots that spring up when corn stalks are cut for silage-making. However, pigs are fairly immune to poisoning of the description referred to, as they do not usually eat a sufficient quantity at any one time. In this sense they are unlike cattle, which eat a very large quantity in comparison and then lie down and chew the cud. It does not pay to take risks, so our advice is to keep the pigs off the young saccaline until it comes into head. After that, it can be fed with safety as portion of the daily ration."

CROWN LAND FOR GRAZING SELECTION.

CASSILIS RESUMPTION.

Approval has been given for the opening for Grazing Homestead Selection of Cassilis Resumption, containig 33,600 acres, at the Land Office, Richmond, on Thursday, 12th April, at 11 a.m.

The area is situated on the eastern boundary of the holding, about 40 miles south of Richmond.

Term of lease will be twenty-eight years, and the rental 2d. per acre for the first seven years of the term.

The block is all high, open, undulating, brown-soil downs, well grassed in normal seasons, with Mitchell, Flinders, and other grasses.

Water supply consists of one sub-artesian bore, equipped with windmill, tanks, and troughing.

Other improvements on the block consist of fencing.

The selection will be subject to a condition requiring the maintenance of the existing rabbit netting fencing, and will require to be stocked to its reasonable carrying capacity with the applicant's own sheep within a period of three years.

Proof must be furnished of the financial standing and pastoral or land experience of the applicants.

Free lithographs and full particulars may be obtained from the Land Agents, Hughenden and Richmond, the Land Settlement Inquiry Office, Brisbane, and the Government Intelligence and Tourist Bureau, Sydney.

BURENDA RESUMPTION.

Approval has been given for the opening for Grazing Homestead Selection of a subdivision of Burenda Resumption, containing about 23,000 acres, at the Land Office, Charleville, on Tuesday, 27th March, 1934.

The block is situated north-easterly from Augathella, about 72 miles from Charleville.

The term of lease will be twenty-eight years, and the rent will be 3d. per acre for the first seven years of the term.

The selection will be subject to the maintenance of the existing rabbit and dog-netting fencing, and will require to be stocked to its reasonable carrying capacity with the applicant's own sheep within a period of three years.

Proof must be furnished of the financial standing and pastoral or land experience of the applicants.

The portion is first-class sheep country, comprising principally all high, undulating black and brown soil plains, nicely shaded, and heavily coated with nutritious grasses and herbage. The whole area is fattening and good breeding country, and is watered from natural and artificial supplies, including an artesian bore. Other improvements are fencing and dams.

Free lithographs and full particulars may be obtained from the Land Agent, Charleville, the Land Settlement Inquiry Office, Brisbane, and the Government Intelligence and Tourist Bureau, Sydney.

General Notes.

Staff Changes and Appointments.

Mr. G. S. C. Birkbeck, Slaughtering Inspector, will be transferred from Gympie to Toowoomba, and Mr. J. R. Canty, Slaughtering Inspector, from Toowomba to Innisfail.

Mr. A. F. Moodie (Inspector of Stock, Julia Creek) and Mr. R. W. Bambrick (Inspector of Stock, Toowoomba) have been appointed also Inspectors under the Brands Acts.

Captain Arthur Broadbent, of the Bowden Pearling Company, Thursday Island, has been appointed an Honorary Ranger under the Animals and Birds Acts and the Native Plants Protection Act.

Messrs. C. A. B. Kenyon, E. P. Foster, and B. H. Halliday, New South Wales Plants Diseases Inspectors, who are stationed near the Border, have been appointed Honorary Inspectors under the Queensland Diseases in Plants Acts.

Mr. G. R. Patten, Analyst in the Agricultural Chemical Laboratory, has been appointed to the position of Senior Analyst in that laboratory.

Mr. T. L. Edwards, of Lake Pleasant, Goovigen, has been appointed an Honorary Ranger under the Animals and Birds Acts.

Mr. F. E. Hockings, of Thursday Island, has been appointed an Honorary Ranger under the Animals and Birds Acts and the Native Plants Protection Act, and Mr. H. N. Hockings, of Thursday Island, has been appointed an Honorary Ranger under the Native Plants Protection Act.

Messrs. F. B. Coleman, R. A. Taylor, and F. F. Coleman, Officers of the Seeds, Stock Foods, Fertilizers, and Pest Destroyers Acts Branch of this Department, have been appointed also Inspectors under "*The Veterinary Medicines Act of* 1933."

Mr. J. R. Canty, Inspector of Slaughter-houses, Innisfail, has been appointed also an Inspector of Stock.

Mr. J. W. Winlaw, Inspector of Stock, Dairies, and Slaughter-houses, has been transferred from Zillmere to Gladstone.

Mr. D. C. Pryce, of Toogoolawah, has been appointed Chairman of the Queensland Cotton Board until the 31st December, 1935.

Pools—An Important Principle Reaffirmed.

The Minister for Agriculture and Stock, Mr. F. W. Bulcock, announced recently that he was in receipt of communications from chambers of commerce and wheatgrowers relative to the action that had been taken in extending the date for lodgment of a petition for a ballot in respect of the continuance or otherwise of the operations of the pooling system as applied to wheat. It is the case that an extension of time for a further fourteen days for the presentation of a petition to be signed by 500 wheatgrowers was asked for and granted. It was realised by him that the prevalence of rain on the Downs preceding the original date for presentation of a petition had added to the difficulty of obtaining the requisite number of signatures of growers demanding a ballot. The principal reason for his decision, however, rested in the fact that it had ever been the policy of the Labour Government since the inception of the pooling system, to allow the majority of growers an opportunity to decide whether or not they desired to adopt the pooling system in respect of their particular industry, and on no occasion had the Labour Government attempted to impose the pooling system of marketing upon the growers of a primary product.

This principle, he contended, was major in comparison to the issue that had been raised by the various bodies, and it was one that should be rigidly maintained, even should its observance be found adverse to some other minor interest of those concerned. The necessary action to extend the life of the Pool had been taken in accordance with the provisions contained in "*The Wheat Pools Act of* 1920 *to* 1930," and the guidance of the Crown Law Department had been obtained where necessary. In the interests of the pooling system generally, it was necessary that every facility should be afforded to the growers of the commodity to indicate their desire to have a Pool extended or otherwise, and it was difficult to conceive that the interests of growers would be disadvantaged to any material degree while this principle was applied. The operations of the former Pool extended until such time as the wheat harvested in the 1932-33 season had been disposed of, and it was somewhat significant to note that no request for the extension of the Pool was lodged by the Wheat Board during 1933.

Public Service—Its Zeal and Integrity.

Following is a reprint of a leading article in "The Courier-Mail," Brisbane's morning daily, of 12th February, 1934:—

The Government's decision to reappoint Mr. J. D. Story as Public Service Commissioner for a further term of three years should be welcomed by every one who knows anything of the services that Mr. Story has rendered to the State of Queensland. Mr. Story will reach the age of sixty-five years in August next, but under the Public Service Act he may be reappointed by the Governor in Council until he reaches the age of seventy. His long career in the Department of Public Instruction has caused some people to regard him as purely an educationist, but he has given to successive Governments sound constructive advice on various other subjects with which he is well acquainted, and his annual reports have contained valuable comment on matters affecting the progress of the community. It was as a result of a visit that Mr. Story paid to America that the State's commodity pool legislation was introduced, and whatever individual opinion may be with respect to the wisdom of such legislation there will be no division of opinion about Mr. Story's activity and zeal on behalf of the State. It is a good thing for a community when its public service includes officers of Mr. Story's type. They are indeed the officers who have made the British Civil Service in all countries the fine thing it is. The civil service (or public service) is the foundaton upon which Parliamentary government rests; and, in the main, the officials are imbued with the highest traditions of conduct and of honour, and are animated with a high spirit of responsibility and of duty. No matter what political party is in power, Ministers know that the advice tendered by the permanent heads in the Government departments is the result of long experience and an earnest desire for the prosperity of the country.

Queensland is remarkably fortunate in its public service. It includes men who might easily have been more prosperous if they had given their attention to commerce or practised a profession. If the general work of the Queensland public service be considered dispassionately the observer will note, first of all, that the great machine runs smoothly, and that that part of the public which has to do with Government departments usually has very little cause for complaint. There must be a certain amount of routine in Government departments, and it is this routine which sometimes causes complaints. There may be an inclination on the part of some public servants to be a little too strict in the readings of Acts of Parliament, and that also causes discontent. But, taken generally, the public service of Queensland is actuated by a desire to help the community, and does render it very valuable aid.

The blue ribbons of the public service cannot be for every civil servant. Some attempt has been made to open wider the avenues to those ribbons by what is known as the age-limit rule; but, however popular this may be, the community in many cases would suffer if all public servants were compelled to retire at the age of sixty-five years. The experience which some civil servants gain is of great value to the State. Some work cannot be performed at all without a long experience; and it seems to be unreasonable that just when a man is really at his best he should be compelled to retire. It is pleasing to note that the record of many an officer in the Queensland public service shows that there is both zeal and efficiency in the service. There is also a great pride in the service on the part of those within it, and when the variety of duties which public servants are called upon to perform for the community is considered there can be no doubt of the ability displayed. Fears have been expressed that there has been a weakening of loyalty because of the regulation allowing public servants to take a more active part in politics than formerly they were; but while that possibly applies to a few it must be admitted that the great majority of officials give equally loyal service to whatever Government is in power.

The Dairy Products Stabilisation Act.

By Proclamation issued under the Dairy Products Stabilisation Act, the 8th February, 1934, was appointed the day for that Act to be brought into operation. An Order in Council made under the same Act provides that the members of the Butter Board and two members of the Cheese Board shall constitute the Dairy Products Stabilisation Board for a period of one year from the 8th February, 1934. The present members of the Butter Board are Messrs. W. J. Sloan (Malanda), R. M. Hill (Bororen), J. McRobert (Maryborough), J. Purcell (Toowoomba), T. F. Plunkett, M.L.A. (Beaudesert), A. G. Muller (Fassifern Valley, Kalbar), and E. Graham (Director of Marketing). The two members of the Cheese Board appointed to the Board are Messrs. H. T. Anderson (Biddeston) and A. J. Harvey (Pittsworth).

"The Veterinary Medicines Act of 1933."

The Veterinary Medicines Act came into force on 8th February. Regulations to give effect to the provisions of the Act have received the approval of the Executive Council, and a Veterinary Medicines Board, consisting of Messrs. E. H. Gurney (Agricultural Chemist), A. H. Cory (Chief Inspector of Stock), St. G. Thorn (Bacteriologist), and J. A. Rudd (Director of the Animal Health Station and Government Veterinary Surgeon) has been constituted. Mr. W. G. McKechnie (Analyst in the Department of Agriculture and Stock) has also been appointed Analyst under the Veterinary Medicines Act.

Annual Carcass Competition—Export Porkers—Special Conditions.

Attention is drawn to the holding of annual carcass competitions by the Queensland Meat Industry Board, the first of which is to be held on the 31st May, 1934, at the Brisbane Abattoir. These competitions provide for beef, lamb, and pork carcasses suitable for the export trade, and should attract considerable attention and be productive of much good to live stock interests in this State.

In class "C" provision is made for six carcasses of pork, dressed weight 60 to 80 lb., first prize £15, second prize £10, and third prize £5. Entries must be made in respect of ten pigs and must be on the form provided for that purpose by the Queensland Meat Industry Board, and must be lodged not less than fourteen days before date on which the competition will be held. A separate entry must be lodged with each exhibit, each exhibitor being allowed no more than two entries. There will be no charge for lodgment of entries.

From each exhibit of ten pigs there will be selected the best six carcasses for the purpose of the competition. If any person lodges two entries in any one class, the animals comprised in each entry must be so marked as to be easily distinguishable from the animals in the other entry. All such marks must be shown on entry form.

All pigs exhibited must be bred and fattened in Queensland, and must have been the bona fide property of the exhibitor for the three calendar months prior to date of lodging the entry. All pigs exhibited must be consigned to the owner's selling brokers and placed by them in their allotted pens at the saleyards, Cannon Hill, and sold by public auction on Monday, 28th May, 1934. All pigs will be exhibited at owner's risk, and while in the saleyards will be subject to the usual saleyards conditions. Each exhibit shall be offered for sale as one lot, and the splitting of any exhibit between purchasers shall not be allowed.

Pigs exhibited will be taken delivery of by the Queensland Meat Industry Board immediately after sale, and on no account will any animal be removed from the Board's pig pens. All pigs exhibited will be slaughtered and dressed on Wednesday, 30th May, 1934, and card showing the dressed weight will be placed on each carcass. The Board reserves the right to cut any exhibit of pork into such portions as it so desires, and will be prepared to purchase at the original purchase price any carcass which has been so cut. The pork exhibited shall be delivered to the purchasers of the live stock on the morning of Friday, 1st June, 1934.

In the pork competition the judge must reject any carcass which is below the stipulated minimum weight, but may allow in the exhibit any carcass over the stipulated maximum weight, provided that the average of the six carcasses in the exhibit does not exceed the stipulated maximum weight. The judges shall not award any prize unless they deem the exhibit for such prize to have sufficient merit. A standard scale of points has been decided upon, and a copy of the completed scale will be sent to each exhibitor, who will thus be able to detect his faults by the number of marks in relation to the maximum.

Any further information required may be obtained from the Secretary, Queensland Meat Industry Board, Cannon Hill, Queensland.

Prohibition of Removal of Sugar-cane Plants from Kalkie District.

A Proclamation, made in pursuance of the provisions of "*The Diseases in Plants Acts, 1929 to 1930*," prohibiting the removal of sugar-cane plants, for any purpose other than to be milled at Millaquin sugar mill, from the quarantine area embraced in that portion of the Kalkie district described below, has received Executive approval. This quarantine area has been declared owing to the prevalence of Fiji disease of sugar-cane, and it may be described as being the area of land bounded by the Back Ashfield road on the south, the Ashfield road, and thence a line drawn in continuation to the Burnett River on the east, the Burnett River on the north, and the boundary of the city of Bundaberg on the west. The removal of sugar-cane plants from this area is prohibited, unless a permit in writing shall have been first granted by an inspector in the prescribed form.

Rural Topics.

Maize versus Sorghum as Silage.

Saccaline sorghum has become very popular with dairy farmers as a silage crop; so much so, in fact, that several delegates to the recent Upper North Coast (New South Wales) Agricultural Bureau Conference expressed surprise that maize should be considered by anyone as being superior to saccaline for silage making. Officers of the Department of Agriculture of New South Wales, however, have always claimed that maize is a better silage crop than sorghum, being less subject to disease and producing fodder of higher feeding quality.

In the coastal fodder conservation championships of past years, practically every competitor has favoured maize silage. Commenting on this point the Chief Instructor of Agriculture (New South Wales), who judges these championship competitions, explained that maize excels all other fodder crops in the total nutrients produced per acre. On the poorer soils, however, sorghum yielded better than maize.

Writing on the subject of suitable silage crops, the Senior Agricultural Instructor stationed on the North Coast (New South Wales) says: "Maize makes the best silage. It is bulky, produces a heavy tonnage per acre, and retains its moisture well. Generally speaking, it is at its best stage for cutting when the grains cut like cheese, which is approximately three weeks later than the roaster stage. It has been found, however, that sappy stalks lend themselves better to packing and compressing in a trench silo (very dry and pithy stalks should always be avoided); and it is therefore not always advisable to wait for the grain to become cheesy. In this connection some discretion should be used.

"It sometimes happens that farmers' crops are of different ages—one patch ready for silage and the other immature. It is preferable to allow the latter to mature nearly to the correct stage, provided, of course, the earlier crop does not lose too much of its succulence. The ripest maize should be pitted first. Good maize silage should have a fairly high percentage of cobs scattered through it.

"Sorghum, cut between the flowering and firm seed stages, has become a very popular crop for silage. Because of its drought-resistant capacity it does well on second-class soils."

Crutching of Sheep.

Crutching usually takes place about midway between shearings, and is therefore considered to be of some value as a preventive of blowfly infestation, as the fly does not operate so freely when the wool is short. With ewes in lamb crutching is usually performed about six weeks before lambing, the object being to clear away all wool from the hindquarters and over the udder, so that at lambing time there will be less attraction for the blowfly, and in order to make it easier for the young lamb when suckling its mother.

Maiden ewes and ewe weaners also require careful crutching, and the whole ewe portion of the flock is usually crutched at the one time. The crutching of ewes should extend well above the tail, taking in all the inner britch and, as stated above, in the case of lambing ewes, the area close to the udder.

Unless the fly is particularly bad, the only time it is necessary to crutch the wethers is when, owing to change of feed or other causes, they become scoured, in which case the soiled wool should be removed. When crutching wethers, therefore, only the wool immediately below the tail will be removed, apart from the usual "ringing."

All sheep which are heavily woolled on the head should at this time be wigged. If this is neglected, such sheep become wool-blind, and, being unable to find their way to the water, fall away in condition and sometimes die. There is greater danger also of grass seed entering the eye when a sheep is very woolly on the face.

Some sheepowners do not consider crutching necessary, but because of the cleaner appearance of the sheep and the absence of trouble with daggy wool at shearing, the operation is recommended, even though the fly may not be active.—A. and P. Notes, New South Wales Department of Agriculture.

Better Export Lambs—Competitions among Breeders.

Not more than 25 per cent. of the lambs sold at Homebush saleyards are the ideal export type. Such a state of affairs makes it difficult for this State to compete overseas in the fat-lamb trade. With the idea of bringing before fat-lamb breeders their shortcomings and of affording them an opportunity to learn how best to improve their methods, Export-Lamb Breeders' Competitions were inaugurated last season. These, taken in conjunction with the Royal Agricultural Society's Export Lamb Carcass Competition, should do much to raise the present standard of our export lambs.

Practically every export lamb-producing district in the State was represented in the competition, and almost every breed at all popular in New South Wales for lamb production was entered. Local competitions were held in most districts, and many of the benefits of these competitions are gained by breeders accompanying the judges during their inspections of the different flocks, when the defects of the animals are pointed out and suggestions offered for their improvement.

Generally speaking, the standard of the lambs exhibited was very good. The first eight teams were particularly good, and in the opinion of the judge (the Senior Sheep and Wool Instructor of the Department of Agriculture) they indicated that our breeders can, with correct methods, produce lambs equal to any in the world. The objective of all other breeders should be to attain as high a standard as the most successful exhibitors in the competition. A comparison of monetary returns would readily prove that any added work and expense along these lines would pay handsomely.

The winning entry was that of Mr. H. S. Henley, "Basset Downs," Cowra, Mr. W. McSweeney, "The Rivers," Canowindra, and Mr. B. J. Stocks, "Linden Hills," Cunningar, occupying second and third places respectively.—A. and P. Notes, N.S.W. Dept. of Agric.

Destruction of Summer Weeds.

The most economical method of destroying summer-growing weeds is by harrowing when the weeds are at a very young stage, but owing to the protracted nature of the harvest due to frequent rains, most farmers were obliged to concentrate all available power and labour on harvesting operations when the weather was suitable, and the fallows had to be neglected. With the completion of harvesting, however, there should be no delay in cultivating fallows to destroy the weeds, for they should not be allowed to flourish any longer than can be avoided, as they are continually pumping up moisture from the soil and utilising plant food, thus nullifying the work that has already been done in fallowing the land. Furthermore, if the weeds are not destroyed without delay they will foul the land with their seeds, and if the cultivation is left till near the sowing period the undecomposed plants will prove a hindrance to the satisfactory sowing of the wheat.

The best implement for destroying a heavy growth of weeds is the disc cultivator. Under normal conditions the use of this implement has a damaging effect on the fallow by disturbing the compacted seed-bed, especially if the working is performed near the sowing period. If, however, the disc cultivation is carried out at the present time, particularly in the later districts, there is a reasonable probability, judging by the nature of the season, that sufficient rain will fall subsequently to restore the compactness of the seed-bed before sowing.

The rigid-tined cultivator, when fitted with wide shares, is also effective in destroying weeds, but in the event of rain falling shortly after the cultivation there is a greater risk of a proportion of the weeds taking root again.—A. and P. Notes, New South Wales Department of Agriculture.

A Point in Milking.

Most of the troubles in milk and cream are caused by organisms closely associated with cow manure. Milk in the udder of a healthy cow in normal condition is practically free from bacteria, but directly it is drawn from the cow by ordinary methods of milking it may contain many thousands of bacteria per cubic centimetre. The first point of infection is the teat. Cows lying down will often squeeze out a drop of milk, which becomes infected with bacteria from the ground. These work up through the teat canal and multiply rapidly.

Thus the first milk drawn from the cow generally contains large numbers of objectionable organisms, and dairymen are well advised to discard the first few squirts of milk as drawn. Practically nothing is lost in doing so, as it has been definitely proved that this first milk contains practically no butter-fat.

The Export Trade in Pig Products.

At the recent annual meeting of the North Canterbury Co-operative Sheep Farmers' Freezing Company (New Zealand), the chairman, Mr. J. H. Blackwell, had this to say:—

The attention of producers can, with advantage, be given to developments now taking place in the pig export business. Hitherto this has been almost negligible as far as New Zealand is concerned, and for the five years ended 1932 the annual export of pork carcasses ranged from 130,000 to 150,000. The season just ended, however, shows a marked increase to 310,000, a jump of over 100 per cent. in one season.

One of the most striking features of the United Kingdom meat market was the tremendous increase in supplies of foreign bacon imports between 1929 and 1931. In two years these imports rose from 8,250,000 cwt. to over 11,000,000 cwt., or by 33⅓ per cent. This increase alone—2,750,000 cwt.—is estimated to be equivalent in weight to the whole of the lamb imported into Great Britain in 1931. This was one of the greatest factors in depressing the price of lamb, and received especial attention by our representatives at Ottawa.

Great Britain has promoted legislation to restrict foreign imports of bacon, while the Ottawa agreements contain provision for expansion of the New Zealand pig export industry. So far New Zealand has failed to secure anything more than a fraction of this vast market, but has, at any rate, shown that the Dominion can breed and fatten and export the right class of pork. In the South Island hitherto little interest has been taken in the matter of pork export, the proportion of output of 310,000 carcasses this year being:—North Island, 98½ per cent.; South Island, 1½ per cent.

To Maintain Egg Production.

In view of the low return for eggs, it is essential that the greatest care be exercised in the management of the pullets and laying stock generally in order to maintain production at the highest possible level. It is at this time of the year that the careful and skilful poultry farmer reaps the reward of his labours (writes the Assistant Poultry Expert of the Department of Agriculture in current notes). During the flush season a little lack of attention or mismanagement may not have any serious consequences, but from now till next spring no liberties can be taken without the risk of seriously affecting the egg yield.

As far as the young stock are concerned, the main essential is to prevent any crowding, particularly among the later birds, but the mistake should not be made of thinking that the early pullets can be housed in large numbers with impunity. This error, it is not fully realised, leads to much trouble. For instance, such conditions often result in the early moulting of pullets. Again, an early outbreak of chicken-pox is frequently the outcome of unduly crowding the young stock.

On farms where the accommodation does not permit of spreading out the young stock, the best course would be to reduce the second-year hens as much as possible by marketing those which appear unlikely to continue laying through the off season, or to erect some cheap temporary shelter and run to accommodate them, thus making other pens available for the new season's birds.

Correct feeding is another important factor influencing egg production, and this applies not only to the class of feed given, but also to the manner in which it is fed to the birds. The latter calls for much closer attention at this time of the year than it is often given, and a little extra time spent on this work would be amply repaid.

Too often one sees the feed hurriedly thrown to the birds, as if feeding were a task to be got through as quickly as possible. The skilful feeder does not rush operations. He puts down a certain quantity of food, and then stands by for a few moments to gauge the appetites of the birds, and if they show keenness (but not otherwise) gives more food; or he gives the feed all round and then returns to see if more is required. This method should be adopted at both the morning and evening feeding where the wet mash system is employed, the art of feeding being to give just as much as the birds will eat at each feeding time without having any food lying about. In some instances where dry mash is used a partial feed of wet mash is given during the day, and in such cases care is necessary not to feed too heavily with the wet mash, because this will result in the birds becoming surfeited, and thus bring about an unhealthy condition.

Udder Wounds and Treatment.

Such injuries to the udder of the dairy cow as those caused by blows, hornings, kicks, treads, barbed-wire cuts, &c., may not only result in an inflammatory condition of themselves, but may also serve as portals for various specific infections. It is all the more important, therefore, that the injuries should not be neglected.

All dirt and foreign matter should first be removed by careful washing of the part with a weak solution of antiseptic (2 per cent. lysol or similar disinfectant). When cleansed, surface injuries may be dusted twice daily with an astringent such as zinc and starch powder. No further washing should be carried out unless there is considerable discharge. Sometimes pus-forming organisms gain entrance to udder injuries, especially if the wounds extend beneath the skin into the udder tissue. Under suitable treatment these wounds will heal, but frequently, in spite of apparent healing, the organisms remain and later set up mammitis.

Injuries to the udders of cows in full milk are often troublesome, since the milk is constantly leaking on the wound and healing is thus retarded. In spite of any treatment that can be adopted by the farmer, such wounds frequently fail to close completely, there being left a small opening through which milk constantly leaks. This type of wound is not uncommon after injuries to the teats, and surgical measures are necessary to remedy the condition.

The general principles to be followed in the treatment of injuries which penetrate more deeply than through the skin are:—

Cleansing of the wound as soon as possible with weak antiseptic solution.

Removal of all torn shreds or loose pieces of tissue with a sharp pair of scissors, which have been boiled immediately prior to use.

Suturing of the wound with sterile (boiled) thread and needle. (This is best carried out by a veterinary surgeon.)

The protection of the wound from further infection by use of an antiseptic dusting powder applied at frequent intervals, or by the frequent application of an astringent solution, such as white lotion made up with the following:—

Sulphate of zinc, ¾ oz.
Acetate of lead, 1 oz.
Water (boiled), 1 pint.

A white deposit will form in the bottle when it is allowed to stand. The bottle must be well shaken before the liquid is used. For safety the bottle should be labelled "Poison."

If the wound shows much swelling, intense redness and discharge of pus, frequent irrigation will be necessary to keep it clean. Such irrigation should be carried out with any weak disinfectant solution, but permanganate of potash solution, peroxide of hydrogen, or hypochlorite solution are especially useful.

In all cases of udder injury the wound should be protected from flies and dust as far as possible. Hence cows should be kept in a small, clean paddock close to the dairy, and the wound covered lightly with clean gauze, kept in place with adhesive tape, or the udder covered with a suspensory bandage.

Should the wound heal but leave an opening through which the milk leaks, no attempt at treatment should be made by the farmer. The case is one that should have the attention of a qualified veterinarian.—A. and P. Notes, New South Wales Department of Agriculture.

Load Pigs on One Deck Only.

The North Queensland Co-operative Bacon Association draws attention to increased freight rates charged on pig wagons despatched from country stations to factories, and mentions a typical case as follows:—Pig growers are requested to load the bottom tier of pig wagons to maximum capacity before placing pigs on the top tier, thus utilising the whole truck instead of half truck, when number forwarded only warrants half truck. This additional care in loading enables the factory to minimise freight charges. Recently the factory ordered one tier of a pig wagon, and provision was thereby made for loading of up to twenty-five bacon pigs at a freight charge for half wagon of £1 4s. Actually, eighteen pigs only were loaded, some being placed in the top and some in the bottom tier, and this resulted in factory being charged an additional £1 4s. for freight, or £2 8s. for full wagon, whereas the number of pigs sent in was less than that required for one tier only.

It is in matters like this that farmers and trucking agents can do much to assist in reducing manufacturing costs and assisting to make the pig industry a more profitable one.

Green Manuring.

Green manuring benefits the soil in two ways. It enriches the soil, in the first place, by supplying it with a considerable amount of readily available plant-food, and in the second place, by adding humus, and thus improving the soil's texture and its power of absorbing and retaining moisture. When a manure crop is buried, the surface soil becomes enriched by the nourishing materials which the crop during the period of its growth has drawn from the air and from the lower portions of the subsoil, and this material is now placed within the reach of the succeeding crop.

During the growth of the plant the soil has, in addition, been stirred up and disintegrated by the development of the roots. When ploughed under, provided sufficient moisture and warmth are present, the buried mass decomposes with more or less rapidity.

A further important result is the formation of carbonic acid by the decomposition of the buried crop. Carbonic acid is given off abundantly in the fermentation of the mass, and assists in the disintegration of the soil and in rendering available the plant-food contained in it.

With regard to the kind of crop to be used for the purpose of green manuring, a good deal of latitude is permissible. Any crop that is rapid and luxuriant in growth, and that can be readily turned under, is suitable for the purpose, and the selection will be guided by considerations such as the time of year at which it is to be grown, its suitability to soil and district, &c. Among the most effective crops for the purpose are leguminous plants, such as clover, velvet beans, peas, &c., since these are specially valuable on account of their power of obtaining their nitrogen from the air. They are, therefore, specially suitable for soils poor in nitrogen, and are of high value in enriching the soil with this ingredient.

It is a not uncommon fallacy that if a leguminous crop is removed from the land and the roots with their nodules remain, the soil is thereby enriched in nitrogen. The nitrogen taken from the air by legumes in association with certain bacteria in the soil does not, however, exist in the nodules, but is made use of and distributed throughout the plant, and the removal of the above-ground portion of the plant from the land therefore means the removal of a large amount of nitrogen. An increase in the nitrogen content of the soil can only result from the growing of leguminous crops when they are ploughed in, or when they are fed off or soiled to stock, and the resultant manure from the stock is returned to the soil.—A. and P. Notes, New South Wales Department of Agriculture.

English Carcass Competition—Large and Middle White Pigs.

There were ninety-nine entries in the pig carcass classes at the 1933 Smithfield Meat Show, London. The judges, after very careful inspection, awarded thirty-five prizes and commended cards, and of this number no fewer than thirty-one went to carcasses of British breeds, under the control of the National Pig Breeders' Association.

In the first class—one pig above 70 lb. but not exceeding 100 lb. live weight—the Middle White secured four award cards consisting of reserve, third, and two highly commendeds. The awards to Large White and Large White crosses in this class included first and reserve for the porker championship, second (a Tamworth Large White cross), and fourth (Large White Berkshire cross). Two of the three purebred Large Whites entered were highly commended.

In the 100 to 160 lb. class, sixteen out of eighteen prizes were awarded to N.P.B.A. breeds. Four of these went to Large Whites, including first and champion porker and supreme carcass of the show, reserve, and two highly commendeds. Two Middle White entries were awarded H.C., and two Berkshire-Large White crosses were awarded second and highly commended respectively, and a Berkshire was awarded fourth.

Of the five prize cards awarded in the bacon pig class, all were to pigs of the N.P.B.A. breeds or crosses. Large Whites figure in all awards—purebreds to win the third and fourth prizes, and as the top cross in the case of the first and reserve championship, the second and the reserve exhibits.

The Large White breed, which secured the cup for the best pig carcass, previously won the supreme championship in 1928. Since that year the cup has been won once by the Berkshire breed, twice by the Large White Middle White cross, once by the Large White-Large Black cross, and twice by purebred Large Whites.

Since 1928, when championships were introduced for the best carcasses in the two porker classes, Large White and Middle White crosses have won three times, Large White once, Berkshire once, and Middle White once.

The bacon pig championship has been won four times by the purebred Large White, once by a Tamworth Berkshire, once by a Middle White-Large Black, and once by the Large White-Large Black cross.

Rapid Growth in Pigs.

From figures compiled recently in England relating to the average daily gain of pigs in the live stock classes at the Smithfield Show, London, it appears that the Large White breed made the highest breed gain—1.34 lb. per day, as compared with 1.12 lb., the aggregate gain of all pigs in the show. Since 1927 the championship for live pigs not exceeding five months has been won twice by Large Whites and once each by the Middle White, large White-Middle White, Middle-White-Large White, and the Essex breeds, respectively.

The championship for pigs above five months has been won five times by the purebred Large Whites and once by the Large White-Middle Whites in the past six years. The white breeds maintain their popularity in spite of keen competition of black and red breeds and of crosses of these popular types.

Agriculture in Japan—The Farmer the Burden Bearer.

In a description of Japanese life by an Australian observer (A. M. Richards, M.A.) in the "Sydney Morning Herald" of 19th February, occurs these interesting remarks:—

Contrast, however, the state of Japanese agriculture and the lot of the peasant. Japan is only the size (approximately) of New Zealand. In the mere 20 per cent. of that area in which agriculture is possible live 27,000,000 peasants. Farms range in size from about 1 acre to 3½ acres—2½ acres being the average. The Christian movement in Japan has bettered conditions enormously in some areas by its organisation of co-operatives. But they cannot radically alter the whole position, which is dependent upon the huge debt, estimated at 6,000,000,000 yen, which Japanese agriculture as a whole owes to Japanese finance. Sesumi, in his authoritative book on "Modern Japan," quotes cases where the whole rice harvest of farms has been sequestrated to pay the interest account, leaving the family to subsist on the "extras"—eggs, vegetables, &c.

Cheap food allied to simplicity of living makes possible Japan's unique combination of low industrial wages with high industrial efficiency. The peasants' hard-wrung yen swells Japanese capital (through his indebtedness to financial magnates and institutions). And he is, in the last resort, the source of revenue for national expansion, both mercantile and military.

It has always been the policy of modern Japan to foster export industries at the expense of the whole nation. Economic planning is nothing new in the land of the rising sun. While still a medieval, feudal land, the ultra-modern policy of systematic crop destruction was a recognised method of intra-national economic control. Then, when the restoration of 1868 put into control of the national destinies an Emperor and supporters determined on a complete modernisation of political and economic life within their own lifetimes, a scheme of development—a fifty years' plan as it were—was laid down for the mobilisation of the whole national resources to that end. Individual enterprise was left to fill in the outline of the plan. But when individual enterprise needed assistance to complete its own small corner it always got it. "Industrial feudalism" would well describe this system of State-initiated and (in cases of need) State-subsidised industry and commerce at its inception. To-day no great changes would be needed to transform it into full-fledged "intra-national socialism." A "laissez faire" stage Japan has never had.

During the last few years, however, Japan has found herself in a desperate economic situation. Industrialisation has naturally created a large population dependent for its very existence on the margin of profit between "raw" imports and manufactured exports. But when "American prosperity" collapsed, the silk export trade collapsed with it. China and India raised their tariffs against Japanese cotton goods. Resistance to penetration in Asia was renewed in the form of boycotts, which damaged exports and led to the expense of a considerable war. Finally, Great Britain's abandonment of the gold standard robbed Japan of some of the competitive advantages she had long enjoyed, just at a period when she was suffering from the adjustments consequent upon her own return to gold. Hence the present determination to sell at almost any price, even if it can be done only at the cost of still further suffering to the peasant.

Not low wages, therefore, nor industrial efficiency, though both count, but simplicity of life and a nationally controlled economy operating at the expense of the peasant is the secret of Japan's ability to undersell the world. Her almost desperate position in the world depression creates the necessity for doing so.

A Primary Producers' Secretary.

The attributes of a competent secretary of a primary producers' organisation are discussed in the following extract from an article in "The Producers' Review" (Toowoomba) for January:—

A primary producers' organisation must have for its objective something above mere mercenary gain. The soul and spirit of farmer-organisation should be the appreciation and realisation of the fact that all primary producers belong to one family and that their interests are mutual, and one of the chief objectives of the organisation of any particular section of primary producers should be to eventually weld together in one big union all primary producers. This being so, what, then, should be the calibre and attributes of a primary producers' organising secretary?

First of all, he must be one of themselves; in other words, he must understand their outlook on life; he must understand and sympathise with that spirit of independence in the farmer and his wife that drives them on to the selection in its virgin state with no other assets than stout hearts and strong arms and the dream of a "home of our own." He must be possessed of a dynamic force that is the driving power of his particular section of his organisation. He must "think" but not "act" for his executive bodies—the latter is their duty.

A primary producers' secretary is in a totally different category to that of a secretary of a business firm. A mere recorder of minutes is totally unfitted as an organising secretary of a primary producers' organisation. A primary producers' organising secretary must have initiative, originality, constructive ability, and sufficient moral courage to stand for the ideals of farmers' organisation in spite of the effect it may have upon his own position.

The ideal farmers' secretary must understand that something in the makeup of the true farmer which abhors the name of master; that something which impels him to till the soil not altogether for the sordid desire of money-making, but the love to "plough and to sow, to reap and to mow," the keen interest in watching things grow, the love of producing with his own hands, the realisation that by the application of his own labour to the soil he has created something. The joy of his life has been reducing the soil to the finest tilth and planting it, realising that if nature smiles on him he will be rewarded for his labour as far as an abundant crop is concerned. But, alas! nature is not kind. Adverse seasonal conditions begin to cause heartache and disappointment. The ideal secretary must understand these joys and sorrows. They must be in his blood, otherwise he can never accomplish anything of real worth where the primary producer is concerned.

Such a secretary must feel that he is working, not merely for the purpose of holding down his job, but for the common weal. The true secretary of agricultural movements would not waste his time on the job if he were not accomplishing something; assisting to educate those whom he represents; ever aiming at a goal, no matter how far distant its accomplishment may be. No matter how much he realises that it will not be accomplished in his time, he must fight on, with others, in blazing the track. The mere routine secretary, who is happy wound up in red tape or is content to be just a rubber stamp for those who employ him, is of no value in any producers' organisation. Those who run may read, and he is certainly dull of comprehension who does not see in the signs of the times a world-wide organisation of production and distribution. Australia—Queensland in particular—is leading the world in this particular direction with its agricultural machinery.

Throughout the world we hear the murmur of discontent from primary producers. To-day it is a small cloud on the horizon; to-morrow it will be an irresistible storm. The time has long passed when the primary producer should remain the bottom dog. But he does little or nothing principally because he has not the right men to drive him into action. These men are certainly hard to find; they are not born, but made —made through the hard school of practical experience in the first instance; made by the gift of vision and ideals. It is time that primary producers started to produce something besides commodities. They should produce organising secretaries by finding the men in the making, because they will be wanted if primary producers are ever to come into their own. Men are wanted who are not job-hunters, but men who know the potential strength of their own farming community and are prepared to devote a lifetime to developing it.

Only a Good Sow is Worth Keeping.

Seeing that it costs no more to keep a good sow than a bad one, it is obvious that a bad sow must be a money-loser all the time. The bad sow, no matter what her pedigree, is the one which does not do well for her owner, or, in other words, does not achieve what may be considered average results.

The average sow, so far as breeding capacity goes, may be considered capable of performing her duties for at least four or five years, though there are some that will remain profitable much longer than that. If a sow that has been hitherto satisfactory shows a decided falling-off after her first two or three litters, then she should be scrapped forthwith and replaced by another.

It should be borne in mind, however, that the fault sometimes lies with the boar. A change of boar will often work wonders in the herd, and this is a point that must be constantly watched. Many a sow has been blamed for producing small or weakly litters, when all the time it was not her fault at all. When a sow, which is otherwise good and has done well in the past, suddenly fails to maintain her reputation, the possibility of the boar being at fault should never be overlooked.

No sow which does not prove herself to be a good mother is worth keeping. Her performance with her first litter, however, does not necessarily prove her abilities in any direction. If she be a well-bred sow, or with such good points about her that she seems worth keeping, then she should certainly have a second chance, even though she has made a mess of her first attempt. It often happens that a maiden sow which produces a small or poor litter does very much better with her second lot, and will continue to do well subsequently. There may be many reasons why a young sow should fail in the beginning—one of them may be the attempt to breed from her too soon. In most cases it is wiser to wait until a sow is at least ten months' old before allowing her to breed.

Something must be added as to the importance of giving a sow every chance to do her best. No sow can show good results if she be improperly fed, roughly handled, badly housed, or subjected to undue interference at critical times. When failures occur, every pig-breeder should ask himself whether it is really the sow that is solely to blame, or whether there may not have been some contributory cause. In such cases, if there be any doubt, the sow should have the benefit of it; if there be no doubt at all, then the sooner she is fattened off and got rid of the better.—"The New Zealand Farmer."

Large or Small Litters?

One has heard it said before now that big litters are not altogether desirable, the argument against too great fecundity in the sow being that when there are many the pigs can never be so good as when the family consists of a more reasonable number. It is also argued that a sow which produces more pigs than she can comfortably rear, is wasting her substance to no good purpose.

But are these theories borne out in practice: If it were possible, one would, no doubt, regulate the size of the sow's litter on each occasion to the number of pigs that she was capable of rearing satisfactorily—say, eight to ten. But since we cannot do that, surely it is better that a sow should err on the side of extreme prolificacy than in the opposite direction. It is by no means certain that a sow, which produces twelve or more pigs at a time, is over-taxing her strength. If she be well fed and properly looked after she should be none the worse, though to let her try to rear more than ten would, in the majority of cases, be unwise. One hears sometimes of litters of extraordinary size—as many as eighteen or twenty. Obviously to let a sow try to rear so large a lot as that would end in disaster.

The chief advantage of large litters is that it allows a margin for those casualties which often occur. In a very large litter there were certain to be some pigs that are more or less worthless from the first. Such pigs can be sacrificed without any qualms. But even when the family is a large one it is a mistake to weed out any pig that seems to have a chance, until the danger period is over. As a general rule, this extends over the first three or four days after birth. If any pig succumbs from natural weakness or from some unnatural causes, the misfortune will probably occur within the period mentioned. After that one may use one's discretion in regard to the remainder. If there are still too many it may be advisable to scrap one or more of the worst specimens. Unfortunately, when accidents occur to small pigs soon after birth, it is often one or two of the best that are the victims, but that cannot be helped except so far as to take the usual precautions.—"The New Zealand Farmer."

When Cattle Judges Don't Agree.

Thus "Himi" in the "New Zealand Farmer":—"I can't see what he saw in that cow to place her first," said a rather celebrated breeder regarding the decision of an experienced judge at a recent show. It is curious how widely opinions differ. On the Island of Jersey it is generally the rule that a different set of judges is used for the championship awards, and this often causes a reversal of judgment. That is to say that a second, third, or even a fourth prize animal in a class may eventually win the championship. The explanation is that some judges may favour and give more points to vessels, for instance, whilst others may regard body formation or fineness of bone as a greater asset. "No udder, no cow," is generally considered sound opinion, but, of course, it is the finer points of distinction—those which determine between a nearly perfect and a perfect udder, a fine and a superfine bone, a really good body and a body that is better still—which raise the difficulties. And in assessing the value of one attribute as against another the real problem arises. The possession of a fine square bag running well under the body with beautifully placed teats, and showing no cut in the back of the bag, does not prove that the cow is a wonderful producer. This type of animal looks best when she is fresh. On the other hand a cow with a big, deep body, a straight top, pin bones placed high, good setting, with a head nicely dished and intelligent eyes, will look well the whole year through. But, as has already been suggested, it is in the nice and exact balancing of the various qualities that creates the difference of opinion so frequently observed in the show ring.

Silage—Useful Hints.

In an address on silos and silage at the recent Upper North Coast conference of the Agricultural Bureau of New South Wales, Mr. Alex. Smith, of Bandon Grove, gave a number of useful hints concerning a form of fodder conservation the advantages of which no dairy farmer can afford to overlook. With regard to the varying character of silage, it was stated that the British Ministry of Agriculture recognises four types—

(1) *Sweet Dark Brown Silage.*—Made when the material heats up too much and the temperature rises above 113 deg. Fahr. Factors contributing to this are a comparatively dry crop, either one that is dry from being mature, or from being allowed to dry somewhat after being cut. Such dry crops facilitate fermentation, both because they do not pack so tightly and thus allow air to penetrate the silo readily, and because the heat that is generated by fermentation has comparatively less moisture in the silage to heat, and, consequently, the temperature rises more.

(2) *Acid, Light-brown or Yellow-brown Silage.*—When less air is allowed to intrude than above, and the material does not heat up so much, this type commonly occurs (temperature range 86 to 104 deg. Fahr.). As a rule there is not much juice expressed from the silage when this type is being made. Acid brown silage is commonly made in pit and trench silos. This silage has a yellow-brown colour, and an acid, though pleasant, smell, largely due to the presence of acetic acid, the yellowish types having the more pleasant smell. It is readily eaten by stock, which thrive upon it, and it is to be recommended. This is the most common form made, and it is much superior to the sweet dark-brown variety.

(3) *Green "Fruity" Silage.*—Usually this quality is only made by chance, and it is hard to control conditions so as to make it with certainty. It is made by rapidly building fresh, lush, leafy grass (temperature about 86 deg. Fahr., but no higher). This type has a green to olive-green colour, and a smell that is delicious —neither sweet nor sour—and is best described as "fresh" and "fruity." It is greedily eaten by stock, and it has recently been shown that its digestibility is very high. It has one disadvantage—much juice is lost.

(4) *Sour Silage.*—Sour silage has generally a dark-brown or olive-brown colour, and a pungent and very unpleasant smell, due largely to the presence of an acid. It is commonly made when a very immature and succulent crop is ensiled. In this case the watery fodder packs down very closely in the silo and excludes the air to such an extent that little heating is possible. Thus crops of immature maize often give rise to sour silage. Again, sour silage is frequently found at the bottom of trench silos —especially if the material has been carted in wet weather, because the trampling of horse and cart over the trench, as well as the super-imposed weight of silage squeezes out the air and limits fermentation. Such defects may be obviated and the sourness reduced if the making of the silage proceeds slowly so that a certain amount of heating may occur in each layer of 3 or 4 ft. before the next layer is put on. This sour silage has a high feeding value, and is quite palatable, despite its unpleasant smell.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of unnecessary deaths.

This article was pubilshed in New Zealand some years ago. It is so suitable to present Queensland conditions that we reproduce it.

MOTHERCRAFT AND THE TODDLER.

What do We Mean by "Mothercraft"?

BY "Mothercraft" we mean the simple science and the art of correct mothering. Does anyone murmur "the maternal instinct"; does anyone still pooh-pooh the idea of applying science to motherhood, saying, "The bird needs no science, nor the cat, a mammal like ourselves?" To such objectors, we would say, in the vivid words of Dr. C. W. Saleeby: "Just because the human mother is human her forte is not instinct, but intelligence. The insect, avian, and feline mother has instinct in various forms and degrees. The cat never gives her kittens 'the same as we have ourselves,' but her own breast. Within the limits set by a certain range of environment to which they are evolutionary adapted, sub-human mothers 'know' all they need to know—which is well, for they can scarcely learn. To learn is to be intelligent. The human mother is that; but intelligence, whilst it can learn everything, has everything to learn. That is why the sub-human mother (and father, of course), relying upon fixed, well-adapted, ready-made instinct, seems superior to ourselves, who make the most deplorable mistakes from the moment we begin. . . ."

Modern human mothering is an art, not an instinct—else why so many bottle-fed babies, when "the good God gives the milk with every mother?" Why so many delicate babies, dead babies? And why has the death-rate fallen and the standard of infant health risen in the community with the increasing application of rational, scientific principles to the feeding and rearing of babies?

The Mothercraft Ideal.

All over the world people are waking up to these facts, and are striving to achieve the mothercraft ideal, which aims at having every baby naturaly fed, and 100 per cent. healthy, happy, and good; every toddler and school child sturdy and robust; every boy and girl aware of the simple essentials for good parenthood—and so back to the beginning of the cycle again, with the mother, healthy and happy before and after birth of her baby, equipped to rear A1 citizens and to deal serenely and successfully with the dangers and difficulties which may come—in other words, to be "the competent executive in her own home."

A grand ideal for which to work! And how much, how very much, remains to be done, especially with regard to the health of the pre-school child and the teaching of simple mothercraft to school children.

The Health of the Pre-School Child.

We propose to elaborate somewhat on this aspect of the subject in a few forthcoming articles, feeling that it is one of the most urgent and important problems of the times.

Whilst it is true that our infantile mortality rate and the standard of health amongst our babies under one year is unequalled anywhere, it is too sadly true that this standard is by no means generally maintained through the later period from one to five years. The splendid babies of a year to eighteen months' old do not necessarily enter school in the "splendid" class.

The Tragedy of the Teeth.

School doctors and dentists tell a woeful tale of the teeth. The proportion of children in Queensland entering school with perfect, or even reasonably good, sets of teeth is shockingly small. We cannot be satisfied whilst this is the case.

Why do the Children Fall Off in Condition?

Speaking very generally, the babies up to twelve or eighteen months' old are "splendid" because the principles of good mothering are understood and applied to the upbringing of babies, at least in some degree, by the great majority of mothers throughout the country. Again speaking generally, the older children "fall off" because the importance to them of those same principles is not understood, and they are denied the advantages of some at least of the simple essentials for good health—studied diet, regular habits, ample sleep, &c.—which are generally conceded to be necessary during infancy.

Continuity.

As a matter of fact, of course, the life of the child cannot be split up into sections labelled "infancy," "pre-school age," &c. It begins at conception, and during the first nine months is bound up with the health and fitness of the mother, but throughout that period and the whole of infancy and childhood the health and well-being of the child is one problem, governed by the immutable laws of nature.

An Appeal.

There is no royal road to success and no short cut. But there are some first steps, which all can take. First we must frankly face the position and realise that we are not doing the best we can for the "little runabouts." The next step is to seek authoritative advice and conscientiously endeavour to understand and follow it.

We have appealed many times to mothers to bring the older children to the baby clinics at intervals throughout the pre-school period, and we appeal again. It is only by whole-hearted "getting together" on the part of both parents and nurses that the best results can be achieved. Then let us get together to remove this blot on our national record.

TOMATO JAM.

Wash and stem the tomatoes, place in cooking vessel, crush sufficient of the fruit to start boiling, and reduce the whole to pulp by boiling, say for half to three-quarters of an hour. Strain all the pulp through a ¼-inch mesh sieve and weigh. Add ¾ lb. sugar for each pound of pulp, and bring to the boil. The cooking time cannot be stated definitely, there being many influencing factors. Fast boiling for approximately an hour to an hour and a-quarter will produce the desired consistency.

As tomato jam made to this receipe is inclined to be insipid, the addition of a little acid in the form of citric or tartaric or pineapple, &c., is a decided improvement. The addition of acid should be done when the jam is about half cooked, and at the rate of 1 oz. to 25 lb. of pulp. Lemon juice may be substituted for tartaric, and if it is desired to use the whole lemons, they should be cut up into very thin slices and boiled for, say, half an hour before being added to the jam.

Apple pectin added to tomato jam has proved a decided success, supplying bulk, combination, and acid in one.

POINTS IN JAM-MAKING.

Use the best crystallised sugar.

The fruit should be sound and not too ripe.

Boil fast, as this preserves the colour and flavour.

Stir as little as possible, for stirring breaks up the fruit and renders it more liable to burn.

Make small quantities at a time; large quantities are not always a success.

Skim off impurities and do not use iron or tin preserving pans.

Use a wooden or an aluminium spoon for stirring.

Seal the jars down perfectly to keep airtight.

Store in a dry, dark pantry.

Orchard Notes for April.

THE COASTAL DISTRICTS.

IN the Orchard Notes for March the attention of citrus-growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus—and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus-growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus become toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruit flies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly-cleared land time to sweeten before planting.

Farm Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April. Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922, Journal.

Potatoes should now be showing good growth, and must be kept free from all weed growths by means of the scuffler. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and where necessary thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat—i.e., those which require a fairly long period to develop in—every effort should be made to bring the seed-bed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

CLIMATOLOGICAL TABLE—JANUARY, 1934.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means. Max.	Means. Min.	Extremes. Max.	Date.	Min.	Date.	Rainfall. Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·75	87	74	90	6	68	31	1,603	19
Herberton	..	78	64	88	5	61	19	1,866	23
Rockhampton	29·89	88	70	98	8	65	13,15,17	177	10
Brisbane	29·97	82	67	92	9	62	23	326	9
Darling Downs.									
Dalby	29·93	86	62	97	1	50	11	213	4
Stanthorpe	..	78	56	90	26	41·4 Record.	11	406	12
Toowoomba	..	78	61	90	1	50	12	542	10
Mid-interior.									
Georgetown	29·77	91	70	99	15	66	23, 24, 26-31	1,223	12
Longreach	29·82	97	72	111	5	62	18	132	2
Mitchell	29·88	90	66	99	1, 2, 3	49	11	80	6
Western.									
Burketown	29·74	94	77	104	21	70	13	590	8
Boulia	29·76	99	76	113	5	66	8	410	4
Thargomindah	29·83	97	74	105	1, 3	62	11	10	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JANUARY, 1933, AND 1932, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. Jan.,	No. of Years' Records.	Total Rainfall. Jan., 1934.	Jan., 1933.	Divisions and Stations.	Average Rainfall. Jan.,	No. of Years' Records.	Total Rainfall. Jan., 1934.	Jan., 1933.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	12·01	33	22·09	8·41	Clermont	5·21	63	1·78	1·44
Cairns	16·78	52	23·72	5·59	Gindie	3·83	35	0	5·51
Cardwell	16·79	62	46·17	12·16	Springsure	4·27	65	0·29	5·03
Cooktown	14·55	58	16·03	5·34					
Herberton	9·60	48	18·66	6·55					
Ingham	15·69	42	31·23	2·45					
Innisfail	20·41	58	35·60	6·12					
Mossman Mill ..	17·41	21	33·75	8·40	*Darling Downs.*				
Townsville	11·11	63	13·87	5·99					
Central Coast.					Dalby	3·28	64	2·13	4·44
					Emu Vale	3·19	38	3·89	5·08
					Hermitage	3·24	28	3·67	6·48
Ayr	11·23	47	9·60	5·16	Jimbour	3·54	46	1·56	4·12
Bowen	10·18	63	8·06	7·36	Miles	3·63	49	3·77	3·46
Charters Towers ..	5·48	52	6·93	1·76	Stanthorpe	3·57	61	4·06	7·52
Mackay	14·48	63	5·38	9·05	Toowoomba ..	5·07	62	5·42	9·40
Proserpine	16·28	31	7·75	5·34	Warwick	3·56	69	3·90	7·48
St. Lawrence ..	9·47	63	0·87	3·40					
South Coast.									
Biggenden	5·40	35	0·39	9·31	*Maranoa.*				
Bundaberg	8·97	51	1·28	12·50					
Brisbane	6·45	83	3·26	10·01	Roma	3·14	60	0·55	2·22
Caboolture	7·72	47	4·34	4·91					
Childers	7·67	39	1·28	8·23					
Crohamhurst	12·61	41	9·21	7·09					
Esk	5·73	47	4·83	5·96					
Gayndah	4·70	63	0·52	6·40					
Gympie	6·72	64	3·24	6·67	*State Farms, &c.*				
Kilkivan	5·60	55	2·79	5·46					
Maryborough ..	7·28	63	2·44	5·61	Bungeworgoral ..	1·84	20	0·54	1·38
Nambour	9·88	38	4·98	5·72	Gatton College ..	4·30	35	4·54	10·26
Nanango	4·69	52	2·14	4·48	Kairi	9·32	20	20·82	5·04
Rockhampton ..	7·83	63	1·77	12·44	Mackay Sugar Experiment Station	14·57	37	5·01	7·27
Woodford	7·91	47	5·75	4·89					

GEORGE G. BOND, Divisional Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	March, 1934.		April, 1934.		MOONRISE. Mar, 1934.	April, 1934.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5·45	6·25	6·2	5·50	6·11	6·17
2	5·46	6·24	6·3	5·49	6·41	6·55
2	5·46	6·22	6·3	5·48	7·11	7·41
4	5·47	6·21	6·4	5·47	7·42	8·35
5	5·48	6·20	6·4	5·46	8·18	9·35
6	5·48	6·19	6·5	5·45	8·58	10·39
7	5·49	6·18	6·6	5·43	9·44	11·45
8	5·49	6·17	6·6	5·42	10·38	..
						a.m.
9	5·50	6·16	6·7	5·41	11·39	12·53
10	5·51	6·14	6·8	5·40	a.m.	1·57
11	5·52	6·13	6·8	5·38	12·45	3·1
12	5·52	6·11	6·9	5·37	1·52	4·4
13	5·53	6·10	6·9	5·36	3·3	5·4
14	5·54	6·9	6·10	5·35	4·9	6·3
15	5·55	6·8	6·10	5·34	5·14	7·3
16	5·56	6·6	6·11	5·33	6·17	8·0
17	5·56	6·5	6·11	5·32	7·18	9·5
18	5·56	6·4	6·12	5·31	8·21	10·1
19	5·56	6·4	6·12	5·30	9·20	10·53
20	5·56	6·3	6·13	5·29	10·21	11·43
						p.m.
21	5·56	6·2	6·13	5·28	11·17	12·28
22	5·56	6·1	6·14	5·27	12·12	1·6
					p.m.	
23	5·56	6·1	6·14	5·27	1·2	1·39
24	5·56	6·0	6·15	5·26	1·49	2·11
25	5·57	5·58	6·15	5·25	2·32	2·40
26	5·57	5·57	6·16	5·25	3·9	3·10
27	5·58	5·55	6·16	5·24	3·41	3·41
28	5·59	5·54	6·17	5·24	4·12	4·14
29	6·0	5·52	6.17	5.23	4·41	4·51
30	6 1	5·51	6·18	5·22	5·12	5·35
31	6·2	5·50	..	..	5·44	..

Phases of the Moon, Occultations, &c.

1 Mar.	○ Full Moon	8 26	p.m.
9 „	☽ Last Quarter	4 6	a.m.
15 „	● New Moon	10 8	p.m.
23 „	☾ First Quarter	11 44	a.m.

Perigee, 12th March, at 7.42 p.m.
Apogee, 24th March, at 3.54 p.m.

Neptune, in Leo, 12 degrees east of Regulus, will be in conjunction with the full moon, which will be passing it 3 degrees to the south on the 1st. It will be in opposition to the Sun on the 2nd.

Jupiter, in Virgo, within 3 degrees of Spica, will be passed by the Moon at 7 a.m. on the 5th.

Mercury will be in inferior conjunction with the Sun on the 6th, but being 3 degrees further north there will be no transit across the Sun's face.

The occultation of Antares, in Scorpio, on 8th March, will occur below the horizon of Warwick, the hour-angle being 8 hours 6 minutes west.

On 11th March Venus will again almost recover its great brilliance, as in December last.

Venus will be in conjunction with the Moon 4 hours after they have both set on the 12th.

Saturn will be in conjunction with the Moon on the 13th, about 2 hours after they have set.

Mercury will be in conjunction with the Moon on the 14th when both are too near the Sun to be seen.

At 2 p.m. on the 16th the Moon will pass 5 degrees north of Mars; on the 18th at 9 a.m. the Moon will pass Uranus, 6 degrees on its northern side.

The Sun will reach the junction between the ecliptic and the celestial equator on 21st March, and will pass from the southern to its northern side, the day and night each having 12 hours.

On the 29th at 7 a.m. the Moon will be passing Neptune at a distance of 3 degrees.

Mercury sets 14 minutes after the Sun on the 1st; on the 15th it rises at 4.41 a.m.

Venus rises at 3.28 a.m. on the 1st and at 2.53 a.m. on the 15th.

Mars sets at 6.57 p.m. on the 1st and at 6.30 p.m. on the 15th.

Jupiter rises at 8.26 p.m. on the 1st and at 7.29 p.m. on the 15th.

Saturn rises at 4.21 a.m. in the 1st and at 3.33 a.m. on the 15th.

Mercury will be near the border of Aquarius and Pisces, Right Ascension 23·14 on the 1st, moving westward into Aquarius to R.A. 22·59 on the 31st.

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7 April	☽ Last Quarter	10 48	a.m.
14 „	● New Moon	9 57	a.m.
22 „	☾ First Quarter	7 20	a.m.
29 „	○ Full Moon	10 45	p.m.

Perigee, 7th April, at 9.12 p.m.
Apogee, 21st April, at 11.42 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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